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NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE, --ETC(U)
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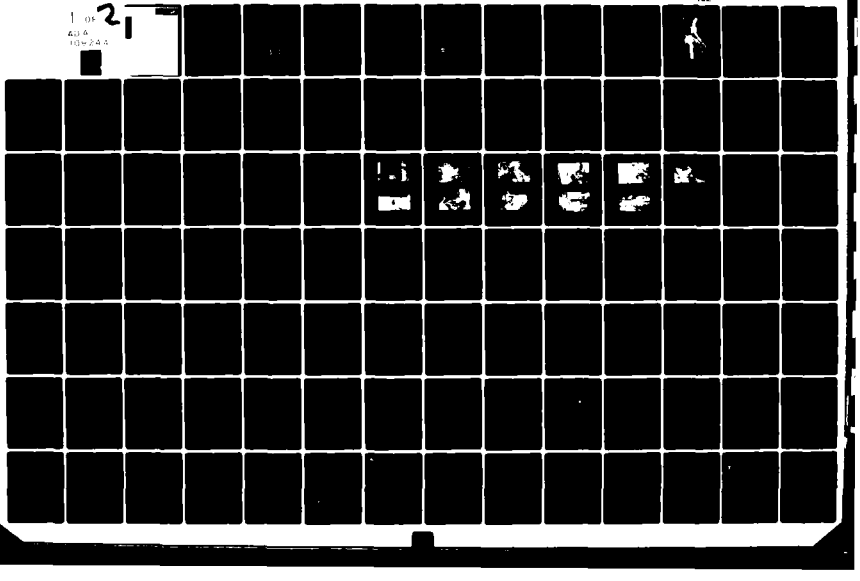

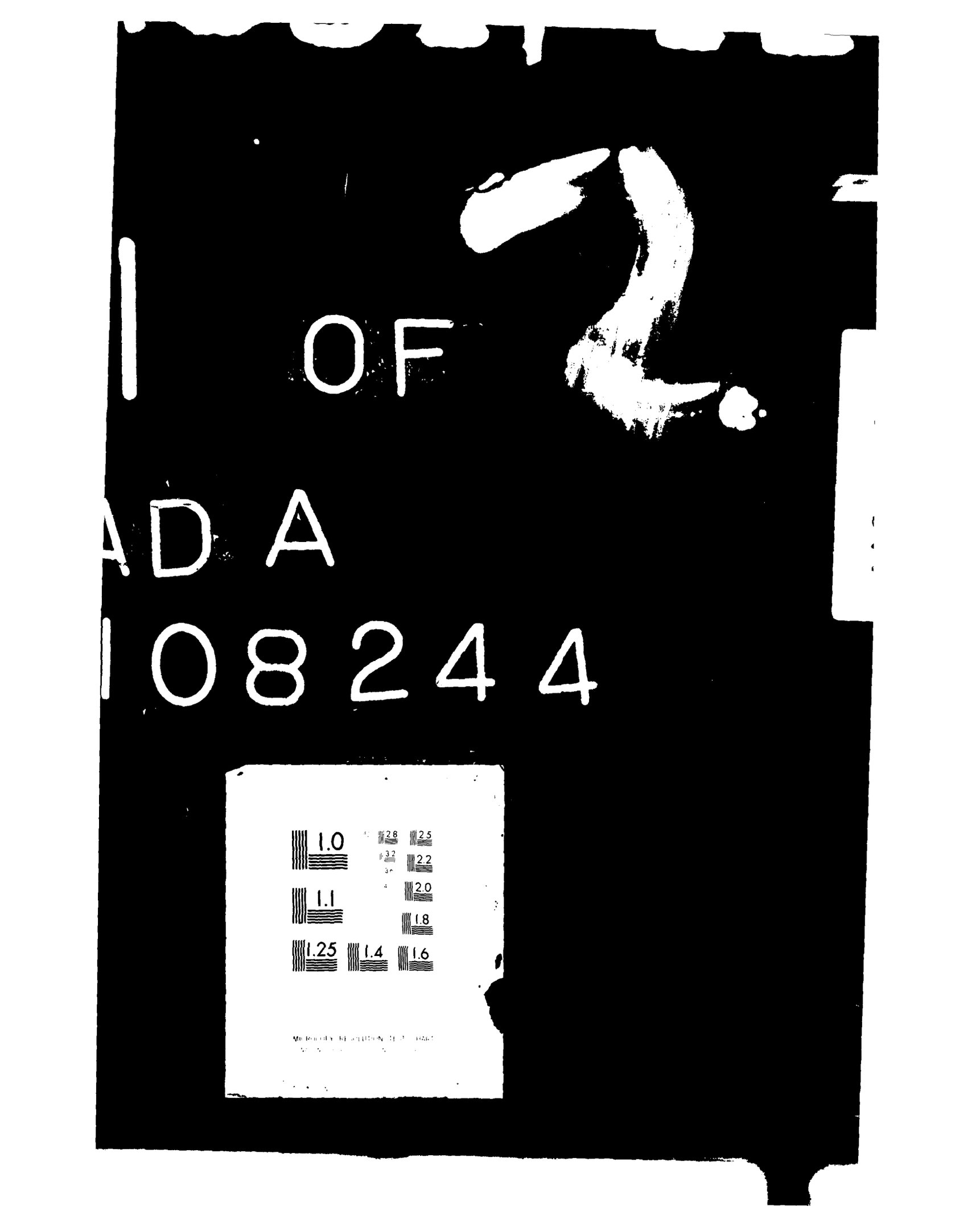
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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
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4. TITLE (and Subtitle) National Program of Inspection of Non-Federal Dams Tennessee. Houser Creek Dam No. 2 (Inventory Number TN 13114) near Union City, Tennessee, Obion County, TN., North Fork Obion River Basin.		5. TYPE OF REPORT & PERIOD COVERED Phase 1 Investigation Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s) DACW-62-81-C-0056
9. PERFORMING ORGANIZATION NAME AND ADDRESS Winsett-Simonds, Consterdine & Associates, Inc. P.O. Box 40045 Memphis, Tennessee 38104		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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Approved for public release; distribution unlimited

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams
Dam Safety
National Dam Safety Program
Houser Creek Dam No. 2, TN
Union City, TN
Obion County, TN
Embankments
Visual Inspection
Structural Analysis

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Houser Creek Dam No. 2 is located in Obion County, Tennessee approximately 2 miles north of Union City, Tennessee. It is an earth fill embankment 26.5 feet high and 1350 feet long and impounds a 23.8 acre lake. The crest width is 14 feet. Facilities for discharge from the reservoir include a concrete service spillway with inside intake dimensions of 9 feet by 3 feet. The riser is 15 feet high located near the center of the impoundment with a 36 inch concrete pipe barrel through the dam. The emergency spillway is located in the left abutment and has a bottom width of 200 feet and side slopes of 1V on 3H. Its

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depth below the low point of the dam is 4.5 feet. A slide gate is attached to the upstream face of the service spillway at the bottom to draw down the impoundment. (At the time of inspection, this gate was open and the impoundment was drawn down.) The embankment slopes are approximately 1V on 3H on the downstream slope and 1V on 3H on the upstream slope. The lack of proper maintenance was found to be the major problem during the inspection of Houser Creek Dam No. 2. A dense growth of trees and brush covered both the downstream and upstream slopes of the dam. The concrete riser also showed signs of vandalism with the removal of debris guards. The dense vegetation on the slopes of the dam prevented a close inspection of the conditions of the slope. The dam is in the small size category and has a downstream hazard potential classification of high by the Corps of Engineers and "I" by the State of Tennessee. On the basis of hydraulic analysis, Houser Creek Dam No. 2 flood storage (845 acre-feet) and emergency spillway are adequate to safely pass the 1/2 Probable Maximum Flood (PMF), which the Office of the Chief of Engineers (O.C.E.) Guidelines specify to be the design flood for a dam in the small size and high hazard categories. At this time, the dam is considered "Significantly Deficient". It is recommended that a qualified engineer be engaged to: Recommend measures to the owner for removal of all trees and underbrush from both slopes of the dam; determine if any unsafe conditions exist on both slopes of the dam after removal of the vegetation; inspect riser, barrel, and plunge pool and recommend remedial measures if needed; evaluate the stability of the dam with earthquake loading; development an emergency action plan to alert downstream residents in the event a major problem develops with Houser Creek Dam No. 2; and, develop a regular inspection and maintenance plan.

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

21 SEP 1981

IN REPLY REFER TO
ORNED-G

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Furnished herewith is the Phase I Investigation Report on Houser Creek Dam No. 2 near Union City, Tennessee. The report was prepared under the authority and provisions of PL 92-367, the National Dam Inspection Act, dated 8 August 1972.

The report presents details of the field inspection, background information, technical analyses, findings, and recommendations for improving the condition of the dam.

Based upon the inspection and subsequent evaluation, Houser Creek Dam No. 2 is classified as significantly deficient due to excessive growth of trees and brush on the embankment.

The recommendation concerning removal of the trees and brush on the embankment and others contained in this report should be undertaken in the near future.

Public release of the report and initiation of public statements fall within your prerogative. However, under provisions of the Freedom of Information Act, the Corps of Engineers is required to respond fully to inquiries on information contained in the report and to make it accessible for review on request.

Your assistance in keeping me informed of any further developments will be appreciated.

Sincerely,

Kenneth D. Bailey, LTC
for LEE W. TUCKER
Colonel, Corps of Engineers
Commander

1 Incl
As stated

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

PHASE I INSPECTION

HOUSER CREEK DAM NO. 2

OBION COUNTY, TENNESSEE

Prepared By:

WINSETT-SIMMONDS, CONSTERDINE & ASSOCIATES, INC.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE

Name of Dam	Houser Creek Dam No. 2
County	Obion
Stream	Tributary Houser Creek
Date of Inspection	April 28, 1981

This investigation and evaluation report was prepared for the Tennessee Department of Conservation, Division of Water Resources by Winsett-Simmonds, Consterdine & Associates, Inc., P.O. Box 40045, Memphis, TN 38104.

Prepared By:

Wm. E. Bush

Wm. E. Bush, P.E., Director
Civil & Water Resources Engineering

ABSTRACT

Houser Creek Dam No. 2 is located in Obion County, Tennessee aprroximately 2 miles north of Union City, Tennessee. It is an earth fill embankment 26.5 feet high and 1350 feet long and impounds a 23.8 acre lake. The crest width is 14 feet. Facilities for discharge from the reservoir include a concrete service spillway with inside intake dimensions of 9 feet by 3 feet. The riser is 15 feet high located near the center of the impoundment with a 36 inch concrete pipe barrel through the dam. The emergency spillway is located in the left abutment and has a bottom width of 200 feet and side slopes of 1V on 3H. Its depth below the low point of the dam is 4.5 feet. A slide gate is attached to the upstream face of the service spillway at the bottom to draw down the impoundment. At the time of inspection, this gate was open and the impoundment was drawn down.

The embankment slopes are approximately 1V on 3H on the downstream slope and 1V on 3H on the upstream slope. The lack of proper maintenance was found to be the major problem during the inspection of Houser Creek Dam No. 2. A dense growth of trees and brush covered both the downstream and upstream slopes of the dam. The concrete riser also showed signs of vandalism with the removal of debris guards. The dense vegetation on the slopes of the dam prevented a close inspection of the conditions of the slope.

Houser creek Dam No. 2 is in the small size category and has a downstream hazard potential classification of high by the Corps of Engineers and "I" by the State of Tennessee.

On the bais of hydraulic analysis, Houser Creek Dan No. 2 flood storage (845 acre-feet) and emergency spillway are adequate to safely pass the ½ Probable Maximum Flood (PMF), which the Office of the Chief of Engineers (O.C.E.) Guidelines specify to be the design flood for a dam in the small size and high hazard categories.

At this time, the dam is considered "Significantly Deficient". It is recommended that a qualified engineer be engaged to: Recommend measures to the owner for removal of all trees and underbrush from both slopes of the dam; determine if any unsafe conditions exist on both slopes of the dam after removal of the vegetation; inspect riser, barrel, and plunge pool and recommend remedial measures if needed; evaluate the stability of the dam with earthquake loading; development an emergency action plan to alert downstream residents in the event a major problem develops with Houser Creek Dam No. 2; and, develop a regular inspection and maintenance plan.

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OLIVIA WILLIAMS PHOTO

PHASE I INSPECTION

HOUSER CREEK DAM NO. 2

OBION COUNTY, TENNESSEE

SECTION 1 - GENERAL

1.1 Authority - The Phase I inspection of this dam was carried out under the authority of the Tennessee Code Annotated 70-2501 to 70-2530, "The Safe Dams Act of 1973", in cooperation with the Corps of Engineers under the authority of PL 92-367, "The National Dam Inspection Act".

1.2 Purpose and Scope - This report is prepared under guidance contained in Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I investigation. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analysis involving topographic mapping, subsurface investigation, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. Additional data or data furnished containing incorrect information could alter the findings of this report.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

1.3 Past Inspections - Annual inspections are made by the USDA Soil Conservation Service. The last inspection was made on May 27, 1980.

1.4 Miscellaneous Details - On the day of the Phase I inspection, the weather was clear with a temperature of 87 degrees and the wind was calm. The level of the lake was drawn down to the elevation of the gate valve at the bottom of the riser.

1.5 Inspection Team Members - Field inspection was made by the following Winsett-Simmonds, Consterdine & Associates, Inc. personnel:

William E. Bush, P.E.
Civil Engineer

Dr. Fred H. Kellogg, P.E.
Geotechnical Engineer

The team was accompanied by Messrs. George Moore and David Roe of the Tennessee Division of Water Resources.

SECTION 2 - PROJECT DESCRIPTION

2.1 Location - Houser Creek Dam No. 2 is located in Obion County, Tennessee approximately two miles north of Union City, Tennessee. It can be located on USGS map "Union City, Tennessee" at longitude 89°5'52" and latitude 36°26'45".

2.2 Description

2.2.1 Embankment - The Houser Creek Dam No. 2 is an earth embankment dam with a northeast-southwest orientation, a maximum height of 26.5 feet and a length of 1350 feet. The crest width is 14 feet. The upstream slope averages 1V on 3H and the downstream slope averages 1V on 3H.

2.2.2 Service Spillway/Low Level Outlet - The service spillway is a concrete structure with inside dimensions of 9 feet by 3 feet and is 15 feet high. This structure has a 36 inch concrete pipe barrel through the dam with a cantilevered outlet. Drawdown facilities are provided by a 24 inch head gate attached to the bottom of the concrete riser.

2.2.3 Emergency Spillway - The emergency spillway is located in the left abutment and has a bottom width of 200 feet and side slopes of 1V on 3H. Its depth below the low point of the dam is 4.5 feet and its maximum capacity at this depth was calculated to be 5100 cfs.

2.2.4 Reservoir and Drainage Area - The reservoir has a surface area of 23.8 acres at normal pool elevation with a fetch of 1100 feet. The normal impounding capacity of the reservoir is estimated to be 58.2 acre-feet with an additional 845 acre-feet of flood storage. The drainage area is 730 acres and the predominant soil association is Memphis-Loring-Grenada.

2.2.5 Miscellaneous - The dam was built in 1964 under PL 566, "The Watershed Protection and Flood Prevention Act". The design was by the USDA Soil Conservation Service, Nashville, Tennessee. The present owner is Dr. W. B. Dunlap. The Houser Creek Watershed District is responsible for maintenance of the structure.

SECTION 3 - INSPECTION FINDINGS

3.1 Specific Findings

3.1.1 Embankment

Geology - The soils found in the area of Houser Creek Dam No. 2 are generally low plasticity, silty clay belonging to Group "CL" of the Unified Classification System.

The Houser Creek Dam No. 2 lies upon the unconsolidated sediments of the Gulf Coastal Plain. These sedimentary beds have a gradual dip in a West-North West direction. This area is blanketed with 20 feet or more of brown silty loess. Formations of the Eocene series lies below the loess. The Jackson formation lies immediately below the loess and below this are formations of the Claiborne group. Shallow wells in the area, less than 130 feet in depth, usually tap sand members in the Jackson formation. Deeper wells in the area tap the thick sands of the Claiborne group.

Crest - The longitudinal alignment of Houser Creek Dan No. 2 is straight with a northeast-southwest orientation. The crest is traversed with a unpaved road that is in poor condition with several deep ruts made by vehicle traffic that were holding water. Approximately, the west half of the crest has been pitched so that water drains down the backslope.

The crest receives very little protection from the remaining sod. No longitudinal or transverse surface cracks were observed on the crest. The reservior had been completely drawn down at the time of inspection.

Upstream Slope - The undesirable vegetative growth on this slope is extremely bad. Trees up to 8 inches in diameter, honeysuckle, and blackberry vines prevent a close observation of the upstream slope. In a few open areas, the slope appeared to be benched with a series of small benches approximately two feet horizontal and one foot vertical. No cracks were observed, but a hole (jug) was found near the center of the dam. This hole was approximately 12 to 18 inches deep and 6 inches in diameter and ran parallel to the slope for approximately three feet.

Downstream Slope - Undesirable vegetation similar to that of the upstream slope completely covered the downstream slope and make the observation of holes and other deformities difficult. Several open paths have been made by off-the-road recreational vehicles on the downstream slope. A small bulge was decernable, approximately halfway down the slope on several of the paths located on the western half of the dam. No surface cracks were noted on the slope nor was there evidence of heaving at the embankment toe. The eastern end

of the toe has been encroached on by plowing and other cultivation. No wet or saturated areas or other evidences of seepage were noted. The toe drain was functioning as evidenced by flow from both pipes adjacent to the 36 inch barrel.

Abutment - No erosion of contact of the embankment with the abutment or surface water runoff was observed. The abutments appeared to be in good condition.

3.1.2 Seismic Zone - The Houser Creek Dan No. 2 is in Seismic Zone 3. No record of any stability analysis could be found.

3.1.3 Seepage - There was no evidence of seepage observed during this inspection.

3.1.4 Spillways - The service spillway for Houser Creek Dam No. 2 is beginning to show neglect. Maintenance has not been performed on this structure recently as the debris guards have been removed. Debris completely covers the screen that protects the orifice from debris. Vegetation surrounding the service spillway is so dense that the service spillway structure cannot be observed from approximately 25 feet away. Channels have been dug near the service spillway to drain the sediment pool that has exposed the foundations of the service spillway structure.

The emergency spillway is located in the left abutment. The general condition of the emergency spillway is fair. The entrance channel is grown up with trees and other small brush and in the control section, trees are beginning to grow. The exit channel presently is clear with the lower section under cultivation.

3.1.5 Downstream Inspection and Hazard Classification - The Houser Creek Dam No. 2 has a hazard potential classification of high. There are approximately ten houses located 4500 feet below the dam that are in the probable flood path in the event of a failure of the Houser Creek Dam No. 2.

3.1.6 Hydrology and Hydraulics - According to O.C.E. Guidelines, dams with a high hazard, small size classification should have storage and spillway capacity to pass the ½ to full PMF without overtopping the dam. The Probable Maximum Precipitation (PMP) is 28.6 inches in 6 hours, yielding 26.60 inches to runoff. Time of concentration was estimated to by 0.57 hours and flood storage from normal pool to the low point of top of dam is estimated to be 845 acre-feet. Routing of the ½ PMF (Antecedent Moisture Condition II), produced a peak outflow of 1457 cfs which was safely passed by the structure.

The full PMF was routed through the dam and produced a peak outflow of 5746 cfs. The impoundment cannot pass this peak discharge without minor overtopping of 0.1 feet for 0.25 hours.

The 100-year, 6 hour (AMC III), flood was routed through the structure. The 100-year, 6 hour precipitation was 5.2 inches. The Houser Creek Dam No. 2 contained this storm without flow in the emergency spillway.

3.2 Conclusions and Recommendations

3.2.1 Conclusions

a. Hydraulic analysis indicated that the Houser Creek Dam No. 2 can safely pass the design flood (½ PMF) and can pass the full PMF with minor overtopping of 0.1 feet for 0.25 hours.

b. On the basis of engineering judgement and visual observations, the embankment appears to be stable.

c. Dense undesirable vegetation covers both slopes of the dam making close observation of the slope surfaces almost impossible. The trees and brush should be removed and replaced with sod.

d. The riser appears to have been vandalized as evidenced by the removal of the trash guards and by channels cut at the base of the riser exposing the foundations and the top of the 36 inch conduit.

e. The plunge pool for the outlet pipe is eroding the slope behind the pipe and could cause future problems if not corrected.

f. Houser Creek Dam No. 2 is within Seismic Zone 3. Stability analysis of the embankment with earthquake loading is not within the scope of this report.

g. Houser Creek Dam No. 2 is considered "Significantly Deficient" due to the undesirable vegetation on both the upstream and downstream slopes and in the emergency spillway.

3.2.2 Recommendations

A qualified engineer should be engaged to:

a. Plan and supervise the removal of all trees and underbrush from both slopes of the dam and emergency spillway.

b. Determine if unsafe conditions exist on both slopes of the embankment and design and supervise construction of remedial measures to provide a safe embankment, if necessary.

c. Investigate the service spillway system and suggest corrective measures if needed.

d. Evaluate the stability of the dam with earthquake loadings.

e. Develop a regular program for inspection and maintenance of the embankment and spillway on at least an annual basis.

f. Develop an emergency action plan to alert downstream residents in the event a major problem develops with Houser Dam No. 2.

The owner should replace the trash bars on the riser as soon as possible.

SECTION 4 REVIEW BOARD FINDINGS

The Interagency Review Board for the National Program of Inspection of non-Federal Dams met in Nashville on 6 August 1981 to examine the technical data contained in the Phase I investigation report on Houser Creek Dam No. 2. The Review Board considered the information and recommended that (1) in Section 3.1.1, the paragraph on Geology should be expanded to include a more detailed description of the geology of the area, and (2) the condition classification be changed from "deficient" to "significantly deficient." They agreed with other report conclusions and recommendations. A copy of the letter report presented by the Review Board is included in Appendix F.

APPENDIX A

DATA SUMMARY SHEET

APPENDIX A
DATA SUMMARY SHEET

A.1 DAM - Houser Creek

A.1.1 Type - Earth Fill

A.1.2 Dimensions and Elevations - Elevations were determined from as built plans of the dam.

a.	Crest length	1350 feet
b.	Crest width	14 feet
c.	Height	26.5 feet
d.	Crest elevation	368.5 feet
e.	Service Spillway elevation	357.0 feet
f.	Emergency Spillway elev. left	364.0 feet
g.	Emergency Spillway elev. right	N/A
h.	Embankment slope, U/S (from water surface to crest	1V on 3.0H
i.	Embankment slope, D/S (from lower surface to crest)	1V on 3.0H
j.	Size classification	Small

A.1.3 Zones, Cutoffs, Grout Curtains — None

A.1.4 Instrumentation — None

A.2 RESERVOIR AND DRAINAGE AREA

A.2.1 Reservoir - (Normal pool elevation 357.0, 11.5 feet below the effective crest).

a.	Surface area	23.8 acres
b.	Length of pool	1100 feet
c.	Capacity (Normal pool)	58.2 acre-feet
d.	Maximum surface area	125.0 acres
e.	Flood storage	845 acre-feet

A.2.2 Drainage Area

a. Size - 730 acres (1.14 square miles)

b. Characteristics:

Average watershed slope	2.4%
soil	Memphis-Loring-Grenada
cover	Cultivated land 73%; pasture 24%; water 3%.

c.	Runoff PMF (AMC II)	26.60 inches
d.	Runoff ½ PMF (AMC II)	13.30 inches
e.	Runoff P_{100} (AMC III)	4.50 inches

A.3 OUTLET STRUCTURES

A.3.1 Drawdown Facilities - 24" diameter slide gate on concrete riser. Invert elevation 362.0 feet MSL.

A.3.2 Service Spillway - Concrete riser with inside dimensions of 3.0 feet width and 9.0 feet length. Low stage orifice 6" x 30" at elevation 357 and two high stage weirs 9 feet long and one foot high at elevation 362. Outfall pipe through dam is 36" I.D.

a. Normal pool elev.	357 feet MSL
b. Length of pipe	158 feet
c. Maximum discharge capacity	190 cfs

A.3.3 Emergency Spillway (left abutment)

a. Crest elevation	364 feet
b. Side slope (left)	1V on 3H
c. Side slope (right)	1V on 3H
d. Depth	4.5 feet
e. Bottom width	200 feet
f. Maximum capacity	5100 cfs
g. Control section	20 feet

A.3.4 Emergency Spillway (right abutment) None

A.4 HISTORICAL DATA

A.4.1	Construction Date	1964
A.4.2	Designer	USDA-SCS
A.4.3	Builder	Holt Construction
A.4.4	Owner	Dr. W. B. Dunlap
A.4.5	Previous Inspection	SCS 5/27/80
A.4.6	Seismic Zone	3

A.5 DOWNSTREAM HAZARD DATA

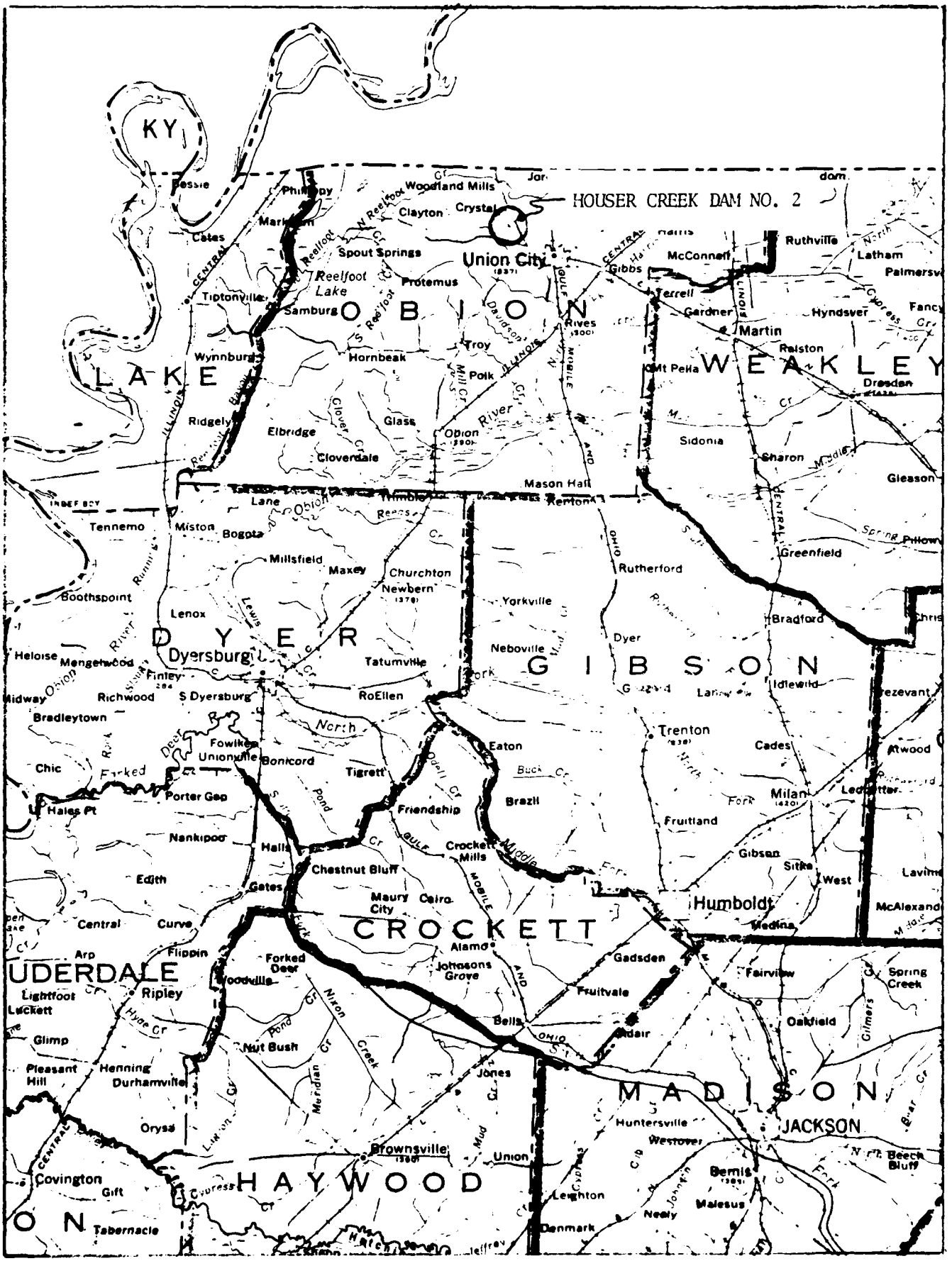
A.5.1 Downstream Hazard Potential Classification

a. Corps of Engineers	High
b. State of Tennessee	I

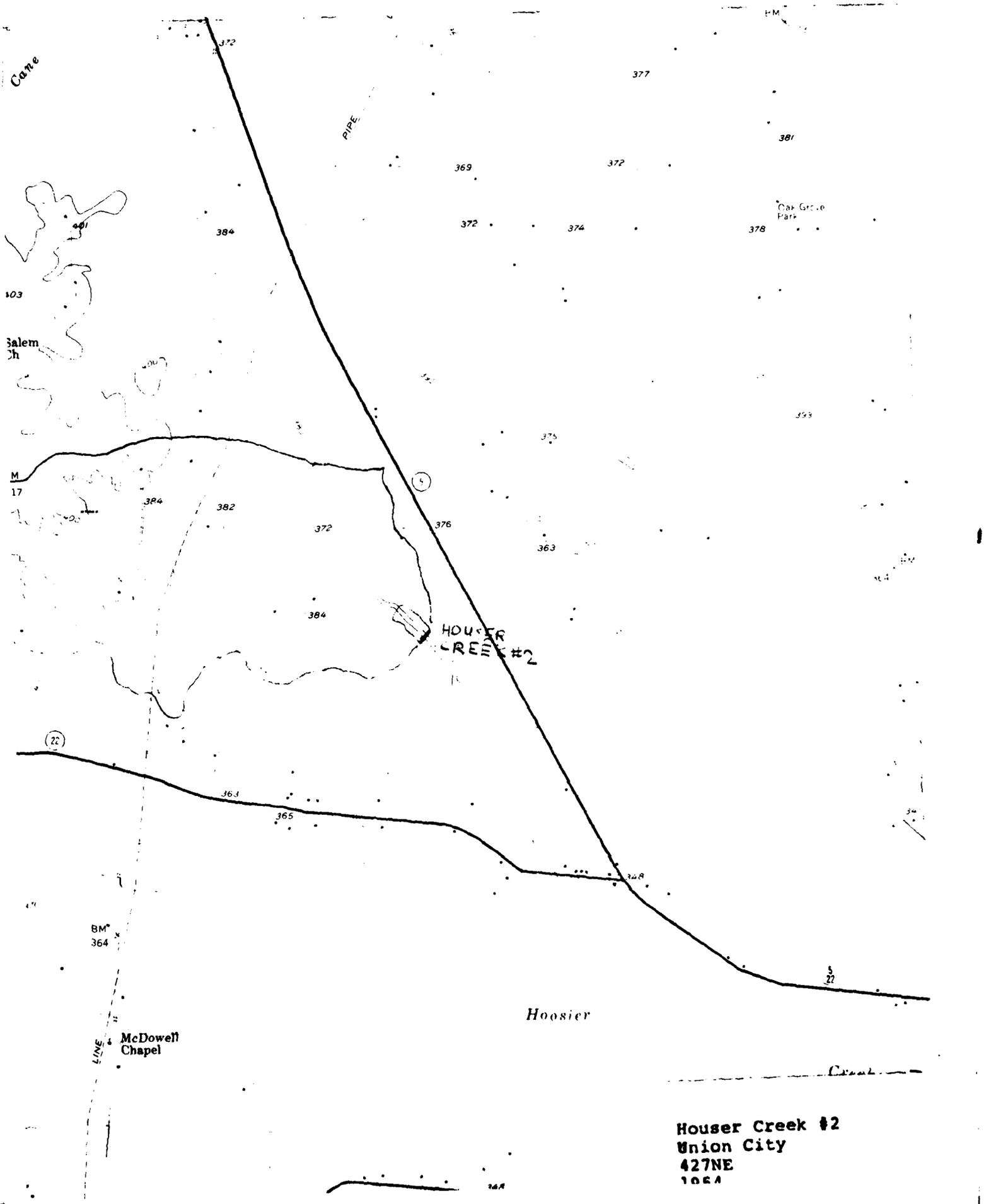
A.5.2	Persons in Probable Flood Path	30
A.5.3	Downstream Property	10 houses & street
A.4.4	Warning Systems	None

APPENDIX B

SKETCHES AND LOCATION MAPS



LOCATION MAP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Union City
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HOUSER CREEK DAM NO. 2

GENERAL PLAN
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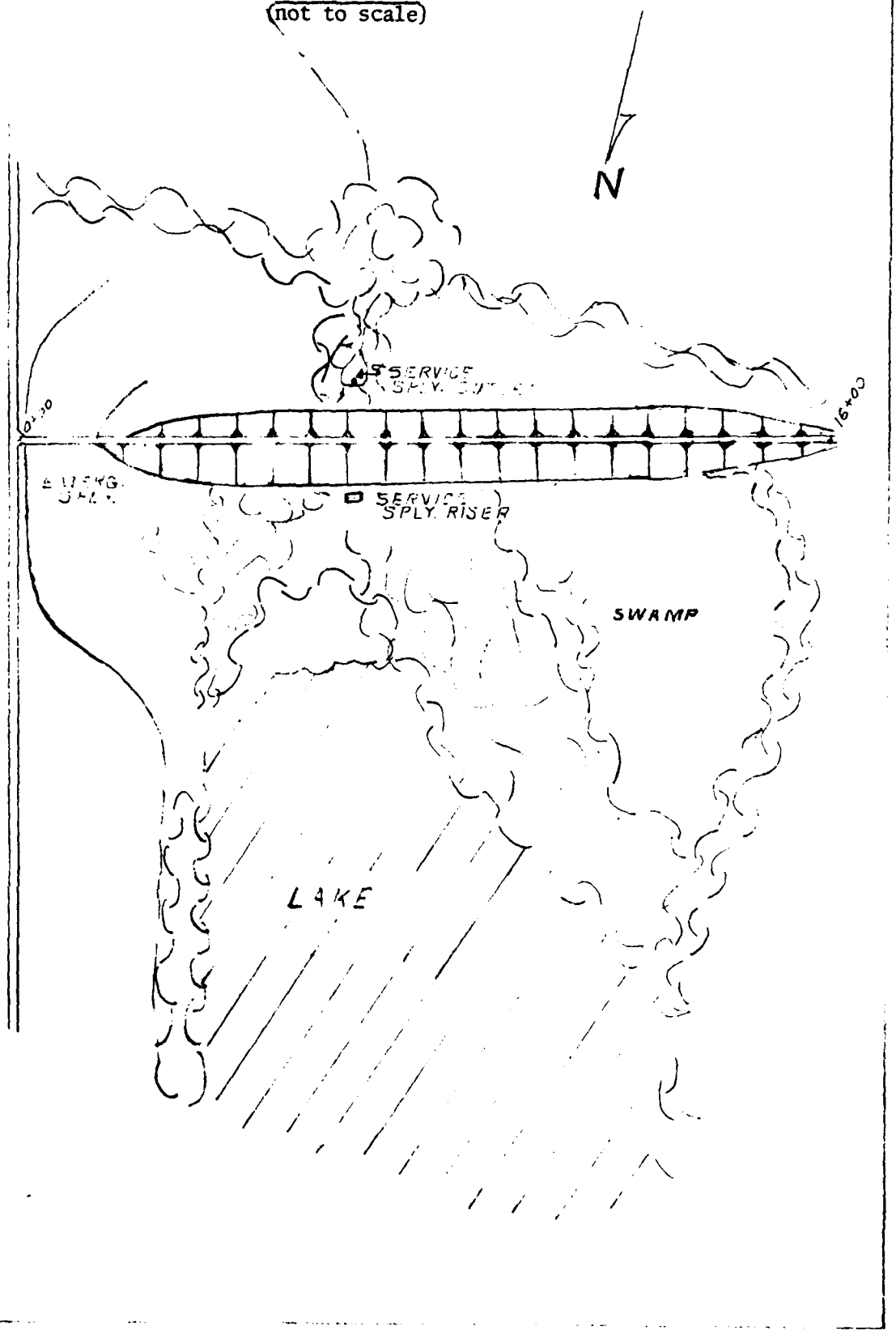

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HOUSER CREEK DAM NO. 2
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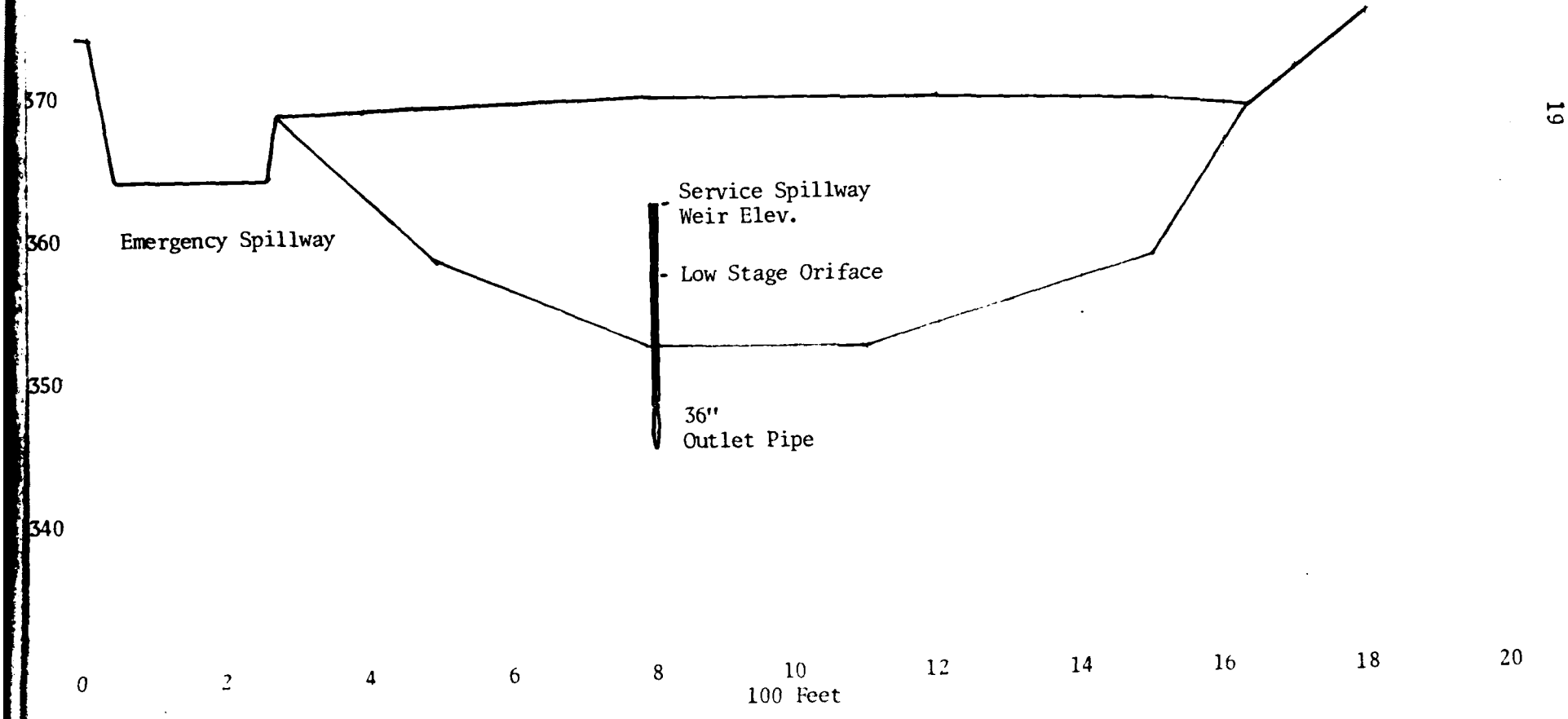

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HOUSER CREEK DAM NO. 2
OBION COUNTY
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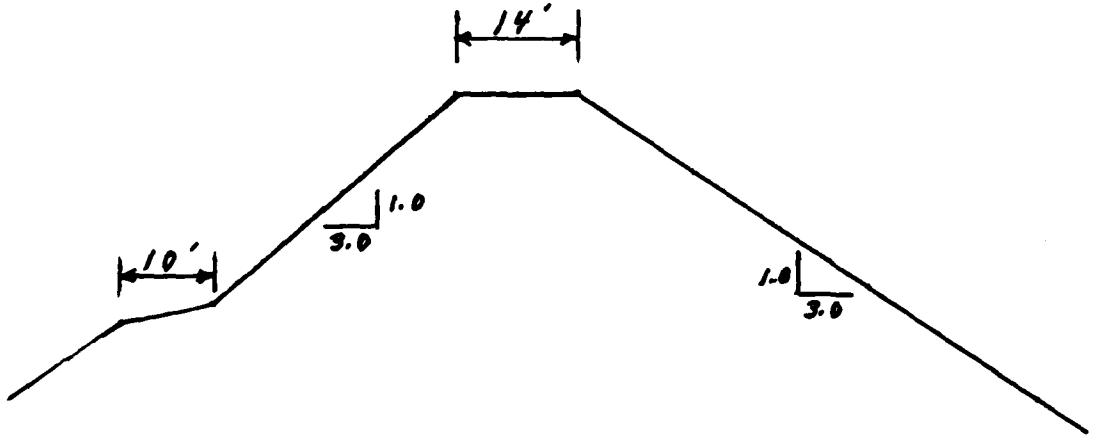

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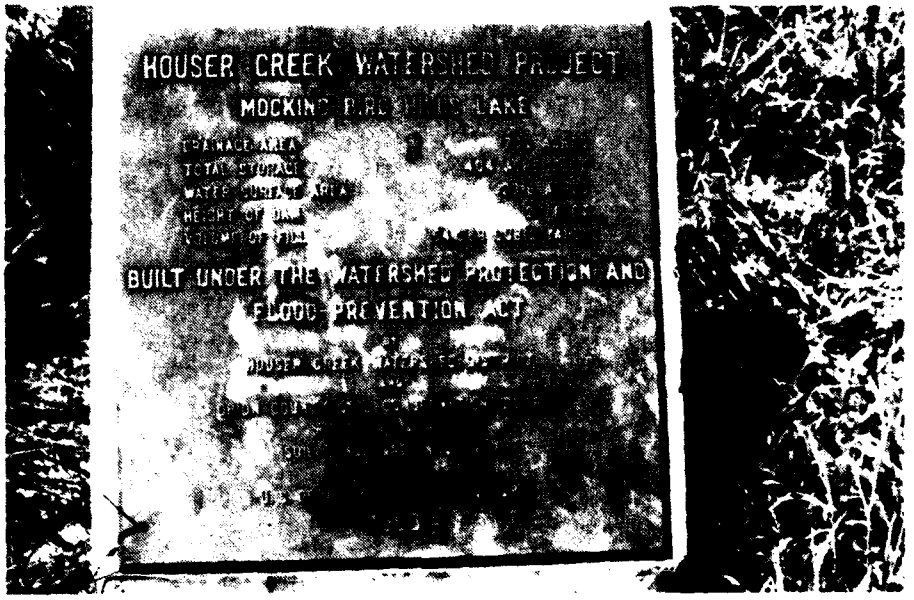
APPENDIX C

PHOTOGRAPHIC RECORD



1. Monument for Houser Creek Dam No. 2.

2. View of top of Houser Creek Dam No. 2 from west abutment.

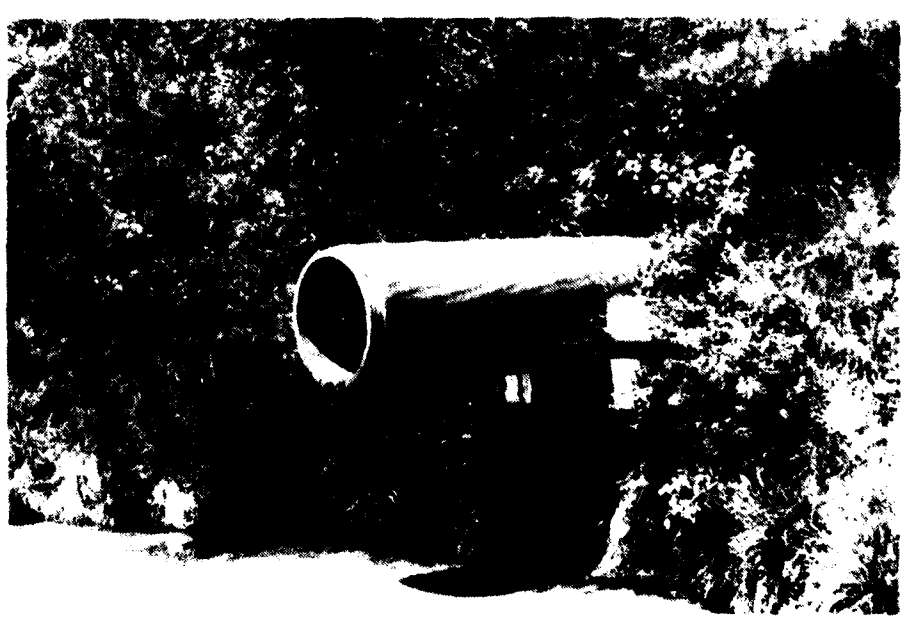
3. Downstream slope near east abutment-typical tree and brush growth.

4. Typical upstream slope vegetative growth. Note riser in center of picture.

5. Hole in upstream slope of Dam approximately 6 inches in diameter at top, 15 inches deep and runs parallel to slope approximately 3 feet.

6. Close up of service spillway riser. Note debris guards have been removed.

7. Excavation at base of riser has exposed foundation and top of pipe.



8. 36 inch outfall pipe and plunge pool.

9. Erosion of bank behind 36 inch outfall pipe above plunge pool.

10. Control section of emergency spillway in east abutment.

11. Subdivision immediately below Houser Dam No. 2.

APPENDIX D

INSPECTION TEAM TRIP REPORTS

TRIP REPORT
HOUSER DAM NO. 2
OBION COUNTY, TENNESSEE

CENERAL ENGINEERING OBSERVATIONS
April 28, 1981

General. An engineering inspection was made of the Houser Creek Dam No. 2 with Dr. Fred H. Kellogg, Kellogg Engineering. The team was accompanied by Messrs. George Moore and David Roe of the Tennessee Division of Water Resources. The weather was clear with a temperature of 87 degrees. The wind was calm. The water level of the lake had been drawn down to the invert of the gate valve on the riser.

Embankment. The longitudinal alignment of Houser Creek Dam No. 2 is straight with a northeast-southwest orientation. The crest is traversed with an unpaved road that has several deep ruts made by vehicle traffic that were hold ing water. The west half of the crest appears to be pitched so that water drains down the backslope. It is estimated that there is a two foot differential in height between the upstream and downstream elevations. No longitudinal or transverse surface cracks were noted. The general condition of the surface is poor. The average top width of the dam is estimated to be 15 feet.

The upstream slope is completely covered with a dense growth of trees up to eight inches in diameter, honeysuckle, and blackberry vines. The slope is impenetrable at certain areas and machetes have to be used to cut through to inspect the surface. The slope is benched with a series of small benches approximately two feet horizontal and one foot vertical. No riprap was observed on

this slope for protection. No cracks were observed, but a hole (jug) was found near the center of the dam. This hole was approximately 12 to 18 inches deep and about 6 inches in diameter at the top. The hole paralleled the slope for approximately three feet.

The downstream slope was essentially in the same condition as the upstream slope with regard to undesirable vegetation. This vegetation made it difficult to observe holes and other deformities on the downstream slope. However, there appears to be a small bulge approximately halfway down the slope along the western half of the dam. There were no surface cracks noted on this slope. No surface cracks or evidence of heaving was noted but at the eastern end of the toe, it has been encroached upon by plowing and the cultivation of the field. There were no wet areas or evidence of seepage on the face of the slope, but the brush and trees were too dense to make a good inspection. The toe drain was functioning. The fill contact with the outlet structure appeared to be good but the plunge pool has eroded back behind the pipe. There was no erosion of contact of the embankment with the abutment from surface water runoff on the upstream or downstream slopes. No springs or indications of seepage along the contact were noted. No springs or indications were noted even a short distance downstream from the embankment.

Instrumentation. There were no monuments for surveys nor were there any observation wells, weirs, piezometers nor other instrumentation.

Spillways. The service spillway is a concrete structure with inside dimensions of 9 feet by 3 feet and is 15 feet high. This structure is a two stage structure

and has a low stage orifice and a high stage weir. The debris guards have been removed from the structure and the orifice guard is completely covered with debris. The 24 inch head gate has been opened and the lake has been drained down to that level. The outlet structure is a 36 inch concrete pipe. Channels have been cut around the structure for drainage so that the foundation of the riser is now exposed. The top portion (8 to 12 inches) of the barrel at its junction with the riser has been exposed. The outlet structure at the downstream end of the pipe is in good condition, but the plunge pool around the cantilevered brace has severe erosion. The toe drains, corrugated metal pipes, were working as evidenced by a small flow from each. The 36 inch pipe barrel appears to be in good condition, from observation of the outlet end.

The emergency spillway is located in the left abutment. The general condition is fair. The entrance channel is grown up in trees and other small brush. Trees are beginning to grow at the entrance of the control section. The exit channel is clear with the lower end of the exit channel being under cultivation. Both the emergency and service spillways are badly in need of maintenance.

The emergency drawdown facility is a gate valve on the service spillway riser. It was open at the time of inspection.

Reservoir. The reservoir slopes are covered with heavy brush near the dam. Upstream, the areas are cleared and appear to be adjacent to cultivated fields. The conditions of the upstream reservoir appear that sedimentation is a problem. Outflow from the structure at this point is very turbid.

Recommendations. The most serious deficiency noted during this inspection is the

lack of maintenance on the structure. The tall trees, blackberry vines, and saplings on both slopes should be removed and both slopes be inspected in detail by a engineer qualified in dam inspections.

Wm. E. Bush, P.E., Director
Civil & Water Resources Engr.
TN License No. 4177

MOCKINGBIRD HILLS LAKE
HOUSER CREEK DAM NO. 2

INTRODUCTION. This is an earth flood control dam built by the U.S. Soil Conservation Service in 1964. The dam is located just west of State Highway No. 5, about two miles northwest of Union City, Tennessee. It is 27 feet high, with a normal pool of 23.8 acres and a maximum surface of 112 acres. The elevation of the top of the dam is 368 feet, that of the normal pool is at 357 feet. The volume of earth fill is 54,268 cubic yards. The lake is fed by a 732 acre drainage area. The dam has been classified as high hazard. The soils are generally low plasticity, silty clay, belonging to Group "CL" in the Unified System.

LEFT (SOUTHEAST) ABUTMENT. This abutment is a gently sloping loess hill, heavily covered with grass and weeds, but with almost no trees. The highway runs along the abutment ridge. No contact erosion has developed at the contact of the abutment and the fill.

EMERGENCY SPILLWAY. The emergency spillway is located at the left abutment. The spillway crest is at elevation 364, and is supposed to be 200 feet wide at this level. The spillway is so irregular and overgrown with grass, bush, and weeds, that this could not be verified. The spillway slopes are quite flat, except at the northwest side, where the road crosses the spillway and transverses the crest steeply. To enter the spillway, it rises steeply again to the west of the dam. A path leading from the crest of the dam to the upstream side of the spillway has

developed some erosion near the crest. The outlet channel leads directly downstream then turns to run at a flat angle to the dam. It is heavily overgrown with grass, bush, and vines. The approach channel rises gently from the normal pool level. Water is retained by an earth furrow at about six inches above a swamp buggy road leading across this channel.

CREST. The crest is 1,350 feet long and 14 feet wide. A rough, unstabilized road runs along the crest. This is half bare, and had water standing in low spots. The crest slopes downstream along virtually the entire length. Where water had been standing, the soil has formed hexagonal drying cracks. The dry soil forms a fine dust under traffic. No longitudinal nor transverse cracks were found. Along the shoulders, there is a heavy grass cover, so cracks, holes, or jugs, if any, are difficult to impossible to see. The soils belong to Group "ML" in the Unified System.

UPSTREAM SLOPE. This slope was design at 1V on 3H. The slope roughly conforms to this, but has developed small benches about a foot, vertically. The slope is generally rough under the the grass along its entire length. It is heavily covered with bush and three to four inch trees, so that, in places, the slope cannot be seen at all. It was possible to determine that erosion had developed under the grass. Near the southeast abutment, the slope is benched and sloughing right at the top of the dam. Toward the northwest, the maximum size of the trees increases to six inches. About two thirds of the way across the dam, a good sized jug has developed in a small bench, a few feet below the crest. It is about six inches in diameter, and extends downward vertically about a foot, then slopes down

another two feet. The slope still has small benches, but they are not as numerous here as they were near the southeast abutment. One lower bench was found about three to four feet above the bottom of the slope, apparently at an old water line.

As the northwest abutment is approached, the maximum size of trees increases to eight to ten inches. The slope here is hidden by bush and vines. About 300 feet from the northwest abutment, there is a small bulge showing on a path leading down the slope. Honeysuckle vines hide the slope for the rest of the way to the northwest abutment.

SERVICE SPILLWAY. The service spillway is a 36 inch reinforced concrete pipe 158 feet long. The riser is just beyond the upstream toe and about one third of the way from the southeast to the northwest abutment. Drawdown is controlled by a slide gate at the riser. High stage pool at elevation 362, and the outlet is at elevation 345. The spillway discharges into a plunge pool. The side just southeast of the pipe has eroded to a vertical, and in places, undercut bank. A berm has been erected between the pool and the downstream toe of the dam. A slight trickle was coming out of the pipe.

NORTHWEST ABUTMENT. The northwest abutment is a loess hill that rises to a considerable height above the crest of the dam. The slope is well covered with grass. No signs of contact erosion were present.

DOWNSTREAM SLOPE. The downstream slope was constructed at 1V on 3H, and generally maintains this slope, although some bulges and benches have

developed. The slope is protected by a blanket drain discharging into two pipes located on either side of the service spillway. Both pipes were discharging small streams of water.

No signs of seepage, wet spots or phreatophytes were noted, although this slope, like the upstream slopes, is so heavily covered with bush, vines, and trees that such conditions could have been missed. Considering the slopes, active blanket drain, and tight soil, it is highly unlikely that any surface seepage has developed.

Near the northwest abutment, this slope is benched just below the crest. The entire slope is very rough, and erosion has developed under the grass. Some stooling has occurred near the northwest abutment. About 300 feet from the northwest abutment, a bulge was seen along a path, about halfway down the slope. About 600 feet from this abutment, another path showed a bulge which looks like the same one. Another 50 feet to the southwest, is a bulge close to the crest. Still another 150 feet to the southeast, the bulge is about halfway down the slope, on a path. Where there are no paths, the slope cannot be seen in this area. The bulge is still visible 150 feet on, through the trees. Near the path to the riser, the downstream slope is benched about one third of the way down from the crest.

The honeysuckle gets thicker and the slope less visible as the southeast abutment is approached. The slope is still rough where the dam is only ten feet high.

RECOMMENDATIONS. In general, the dam appears well-built and safe. However, the growth needs to be burned off both slopes so that these slopes can be inspected more adequately. This is particularly true of the downstream slope. The slopes should be protected by vegetation that develops a thicker root complex than that presently available. After the slopes are cleared, the necessity for any building up or smoothing of the slopes can be better judged. The plunge pool needs protection along its upstream side, with rock or concrete fragments or filter cloth. A more adequate maintenance schedule needs to be developed.

Report submitted 25 May 1981

F. H. Kellogg, P.E.
Consulting Engineer

APPENDIX E

HYDRAULIC AND HYDROLOGIC DATA

HYDRAULICS AND HYDROLOGIC CALCULATIONS

Houser Creek Dam No. 2 is located in Obion County, Tennessee. The present land use is estimated to be 73 percent cultivated, 24 percent pasture, and 3 percent water. The soil is predominantly Memphis-Loring-Grenada and is classified as a "C" soil. The runoff curve number was calculated to be 85 AMC II.

The Houser Creek Dam No. 2 is a small size, high hazard potential dam. As such it is required to pass the ½ PMF without overtopping. Using the U.S. Weather Service TP-40, the 6-hour PMP was estimated to be 28.6 inches yielding 26.60 inches runoff (RCN 85 AMC II). The ½ PMF which is derived from the Probable Maximum Precipitation was routed with a 13.30 inch runoff (RCN 85 AMC II).

The total inflow of the ½ PMF into the reservoir is about 809 acre-feet with a maximum peak of 6712 cfs. Houser reservoir has a maximum storage from the crest of the service spillway to the top of the dam of 845 acre-feet and a maximum spillway discharge rate of 5140 cfs. The impoundment is adequate to safely pass the ½ PMF.

The total inflow of the full PMF into the reservoir is about 1618 acre-feet with a maximum peak of 12,257 cfs. The routed peak outflow was 5746 cfs. The impoundment cannot pass this peak without minor overtopping.

The 6-hour, 100-year flood containing 5.2 inches of precipitation was routed through the dam using a RCN of 94 (AMC III). This produced a runoff of 4.50

inches and a routed peak discharge of 68 cfs. Houser Dam contained the storm with no flow in the emergency spillway and with a freeboard of 5.5 feet.

The 1-10 day, 100-year storm was routed through the structure and did not produce flow in the emergency spillway.

The inflow hydrograph was calculated by methods contained in Section 4, Chapter 21 of the SCS National Handbook. Weir constants in the formula Q=CLH3/2 were found in King and Brater "Handbook of Hydraulics", fifth edition. The routing equation used was:

$$I_1 + I_2 + \left(\frac{2S_1}{\Delta t} - O_1\right) = \left(\frac{2S_2}{\Delta t} + O_2\right) .$$

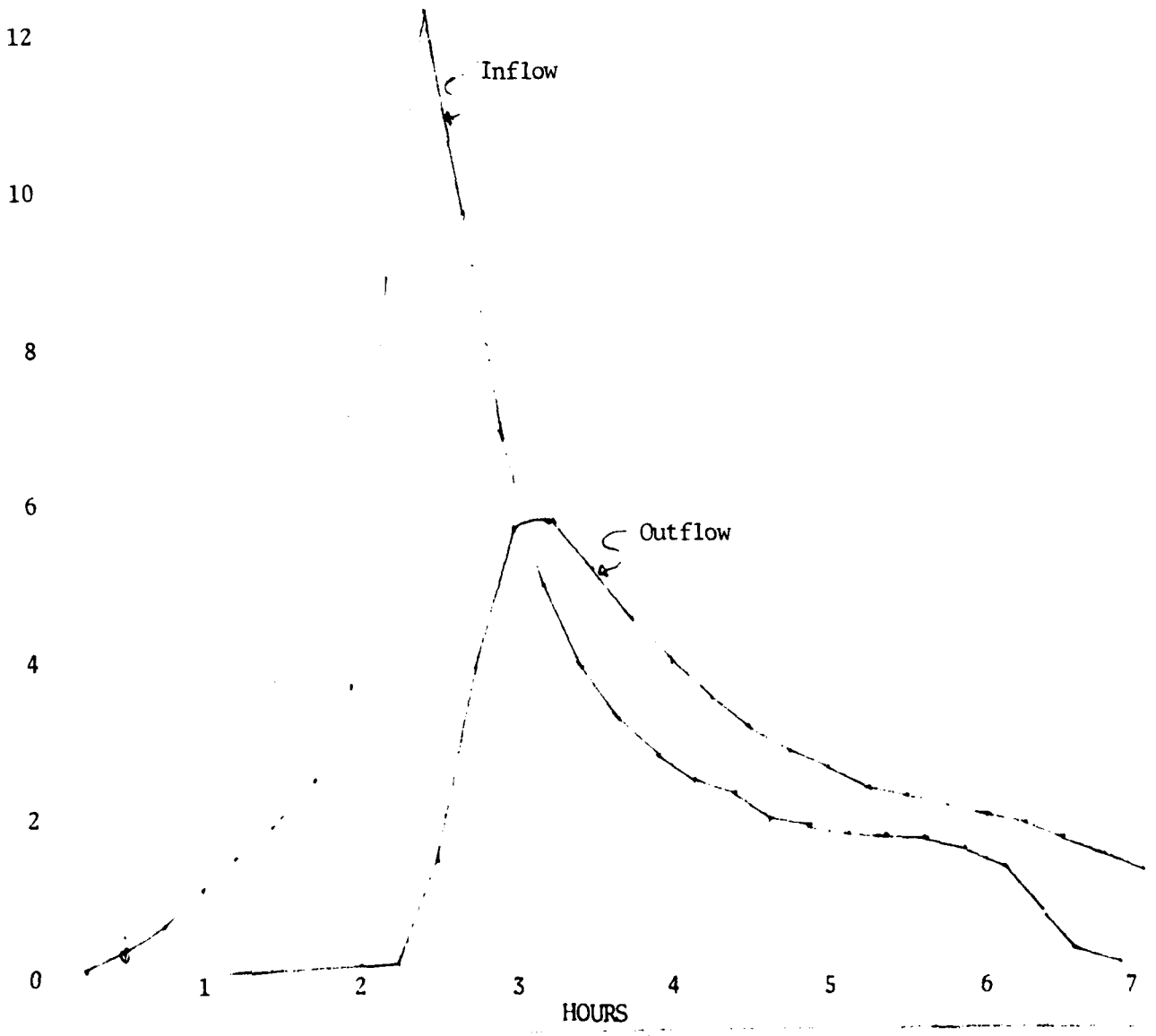
Basic engineering data was obtained from the following sources: Engineering surveys of the impoundment structure; U.S. Geologic Survey Topographic Maps; Aerial photographs; USDA Soil Conservation Service Soil Survey Maps; Rainfall Data and Hazard Classification from the Tennessee Division of Water Resources.

HYDRAULIC AND HYDROLOGIC SUMMARY

Frequency of Occurrence	Duration	Antecedent Moisture Condition II	III
100-year	6-hour	Will Pass	Will Pass
100-year	10-day		
½ PMF[1]	6-hour	Will Pass	Will Pass
PMF	6-hour	Will Overtop 0.1 foot for 0.25 hours	Will Overtop 0.2 foot for 0.3 hours

[1]Probable Maximum Flood

HOUSER CREEK DAM NO. 2
OBION COUNTY
FULL PMF



HYDROGRAPH COMPUTATION

DATE 6/30/81
COMPUTED BY WEB
CHECKED BY

Project- Houser Creek Dam No. 2

FULL PMF

DR. AREA 1.14 SQ. MI. STRUCTURE CLASS _____

T_c 0.57 HR. STORM DURATION 6 HR.

POINT RAINFALL 28.7 IN.

ADJUSTED RAINFALL:

AREAL FACTOR _____ IN. _____

DURATION FACTOR _____ IN. _____

RUNOFF CURVE NO. 85

Q 26.60 IN.

HYDROGRAPH FAMILY NO. 1

COMPUTED T_p 0.40 HR.

T_o 5.85 HR.

(T_o / T_p)

COMPUTED 14.63 ; USED 16

REVISED T_p 0.37

$q_p = \frac{484A}{REV.\ T_p} = 1491$ CFS.

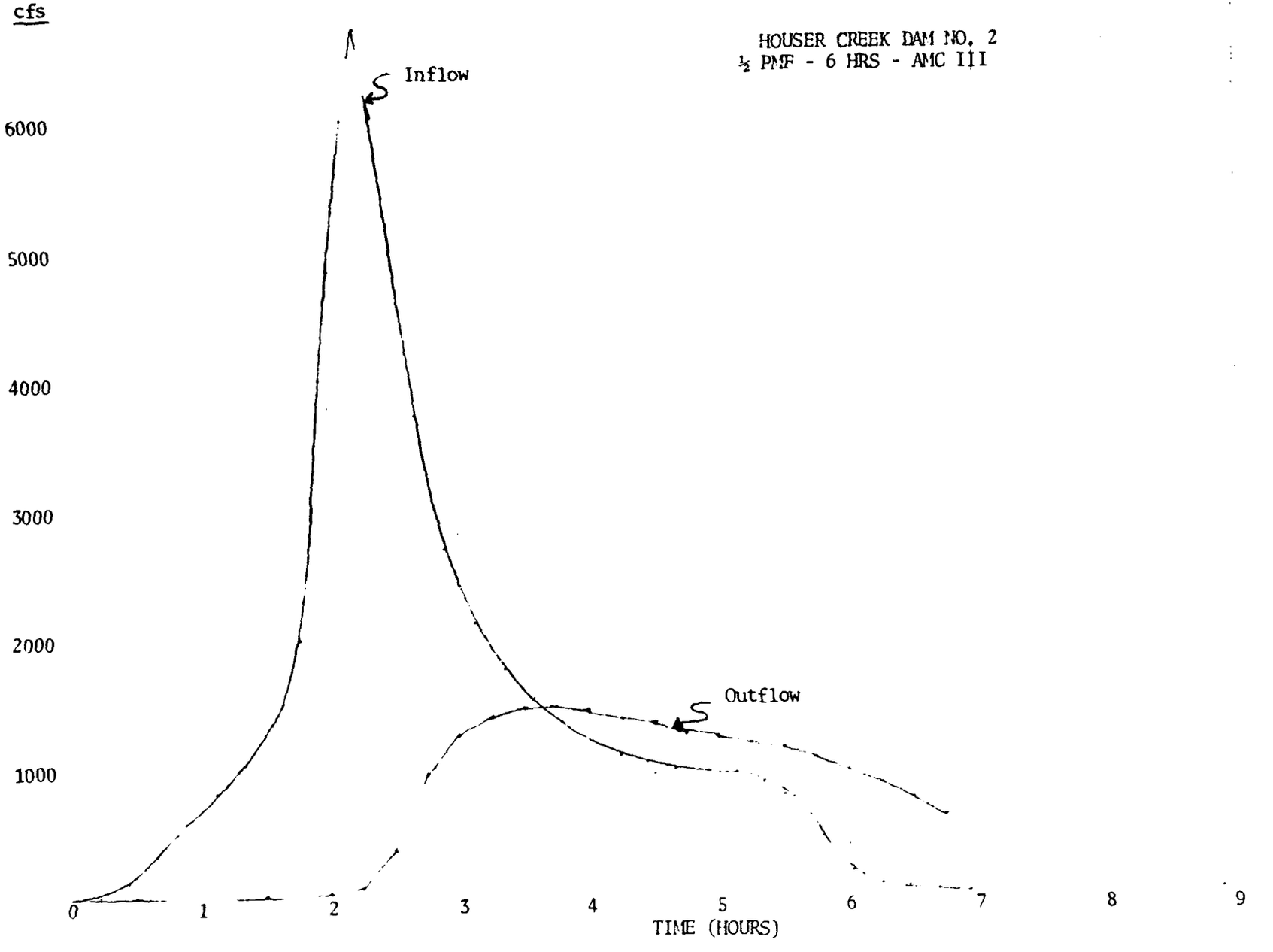
$(Q \times q_p)$ = 39667 CFS.

t(COLUMN) = (t / T_p) REV. T_p q(COLUMN) = $(q_c / q_p) \times (Q \times q_p)$

Q(COLUMN) = $(Q_t / Q) Q$

	$t=(t/T_p)$ Rev. T_p	$q=(q_c/q_p)\times(Q\times q_p)$	$Q_t=(Q_t/Q)Q$
	t HOURS	q CFS	Q INCHES
1	0	0	0
2	0.24	40	
3	0.49	238	
4	0.73	595	
5	0.98	1071	
6	1.22	1468	
7	1.47	1864	
8	1.71	2459	
9	1.95	3649	
10	2.20	8846	
11	2.44	12257	
12	2.69	9639	
13	2.93	6783	
14	3.17	4919	
15	3.42	3848	
16	3.66	3213	
17	3.91	2777	
18	4.15	2420	
19	4.40	2182	
20	4.64	1983	
21	4.88	1864	
22	5.13	1785	
23	5.37	1745	
24	5.62	1706	
25	5.86	1587	
26	6.11	1349	
27	6.35	793	
28	6.59	317	
29	6.84	159	
30	7.08	79	
31	7.32	40	
32		81,675.00	
33	check = 81,675(.24)		= 26.66"
34	645(1.14)		OK

Winsett-Simmonds, Considine & Associates, Inc.
821 SOUTH BARKSDALE STREET P O BOX 9045 MEMPHIS, TENNESSEE 38104
TELEPHONE 901 274-8488
Systems Engineers


cfs
HOUSER CREEK DAM NO. 2
½ PMF - 6 HRS - AMC III
Inflow
Outflow
6000
5000
4000
3000
2000
1000
0
1
2
3
4
5
6
7
8
9
TIME (HOURS)

½ PMF - 6 HOURS - AMC II

HYDROGRAPH COMPUTATION

DATE _____
COMPUTED BY _____
CHECKED BY _____

Project- Houser Creek Dam No. 2

DR. AREA 1.14 SQ. MI. STRUCTURE CLASS _____

T_c 0.57 HR. STORM DURATION _____ HR.

POINT RAINFALL 15.22 IN.

ADJUSTED RAINFALL:

AREAL FACTOR _____ IN. _____

DURATION FACTOR _____ IN. _____

RUNOFF CURVE NO 85

Q 13.30 IN.

HYDROGRAPH FAMILY NO. 1

COMPUTED T_p 0.40 HR.

T_p 5.4 HR.

(T_c / T_p)

COMPUTED 13.50 USED 16

REVISED T_p 0.338

$q_p = \frac{\text{AREA}}{\text{REV. } T_p} = 1632.43$ CFS.

($Q \times q_p$) = 21711.27 CFS.

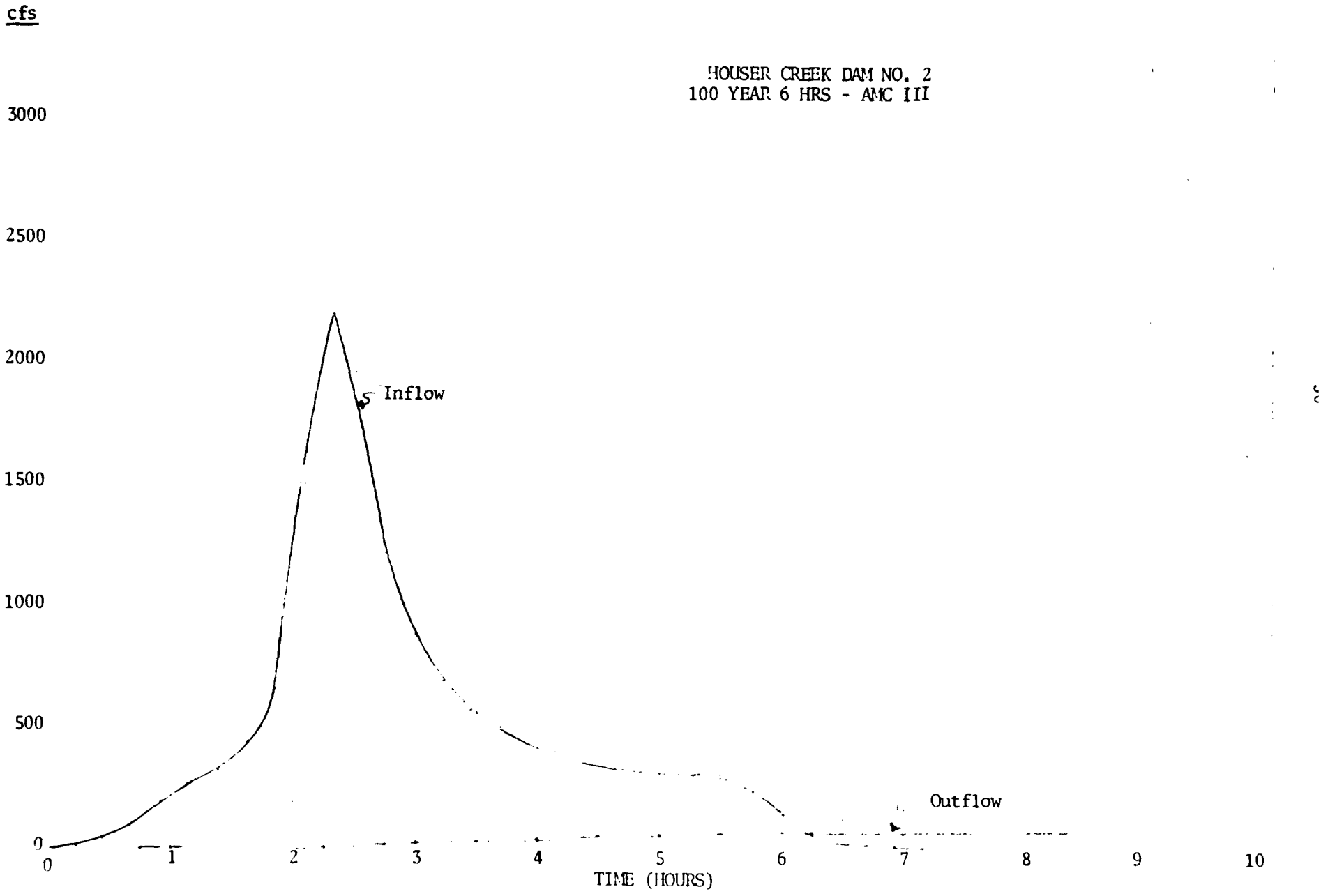
t COLUMN = (t / T_p) REV. T_p q COLUMN = (q_c / q_p) x ($Q \times q_p$)

Q COLUMN = (Q_t / Q) Q

	t / T_p Rev. T_p	q = q_c q_p x Q x q_p	Q_t / Q Q
	t HOURS	q CFS	Q INCHES
1	0	0	0
2	.22	22	
3	.45	130	
4	.67	326	
5	.89	586	
6	1.12	803	
7	1.34	1021	
8	1.56	1346	
9	1.78	1998	
10	2.01	4843	
11	2.23	6712	
12	2.45	5278	
13	2.68	3715	
14	2.90	2694	
15	3.12	2107	
16	3.35	1760	
17	3.57	1521	
18	3.79	1325	
19	4.02	1195	
20	4.24	1086	
21	4.46	1021	
22	4.68	978	
23	4.91	956	
24	5.13	935	
25	5.35	869	
26	5.58	739	
27	5.80	435	
28	6.02	174	
29	6.25	87	
30	6.47	43	
31	6.69	22	
32	6.92	0	
33		44,727	
34	check =	44,727(.22)= 13.38"	

645(1.14) ok

Wilson Simmonds Consulting Associates, Inc
921 SOUTH BARKSDALE STREET P O BOX [illegible] MEMPHIS, TENNESSEE 38104
TELEPHONE 901 [illegible]
Systems Engineers


cfs
HOUSER CREEK DAM NO. 2
100 YEAR 6 HRS - AMC III
3000
2500
2000
1500
1000
500
0
Inflow
Outflow
0
1
2
3
4
5
6
7
8
9
10
TIME (HOURS)

100 YEAR 6 HOURS - AMC III

HYDROGRAPH COMPUTATION

DATE _____
COMPUTED BY _____
CHECKED BY _____

Project - Houser Creek Dam No. 2

DR. AREA 1.14 SQ. MI. STRUCTURE CLASS _____

T_c 0.57 HR. STORM DURATION 6 HR.

POINT RAINFALL 5.2 IN.

ADJUSTED RAINFALL

AREAL FACTOR _____ IN. _____

DURATION FACTOR _____ IN. _____

RUNOFF CURVE NO. 94

Q 4.50 IN.

HYDROGRAPH FAMILY NO. 1

COMPUTED T_p 0.40 HR.

T_o 5.6 HR.

(T_o / T_p)

COMPUTED 14.00 ; USED 16

REVISED T_p 0.35

$q_p = \frac{484A}{REV.\ T_p} = \frac{1576.46}{}$ CFS.

$(Q*)_p$ = 7094.1 CFS.

tCOLUMN = (t / T_p) REV. T_p qCOLUMN = $(q_c / q_p) * Q * q_p$

QCOLUMN = $(Q_t / Q)Q$

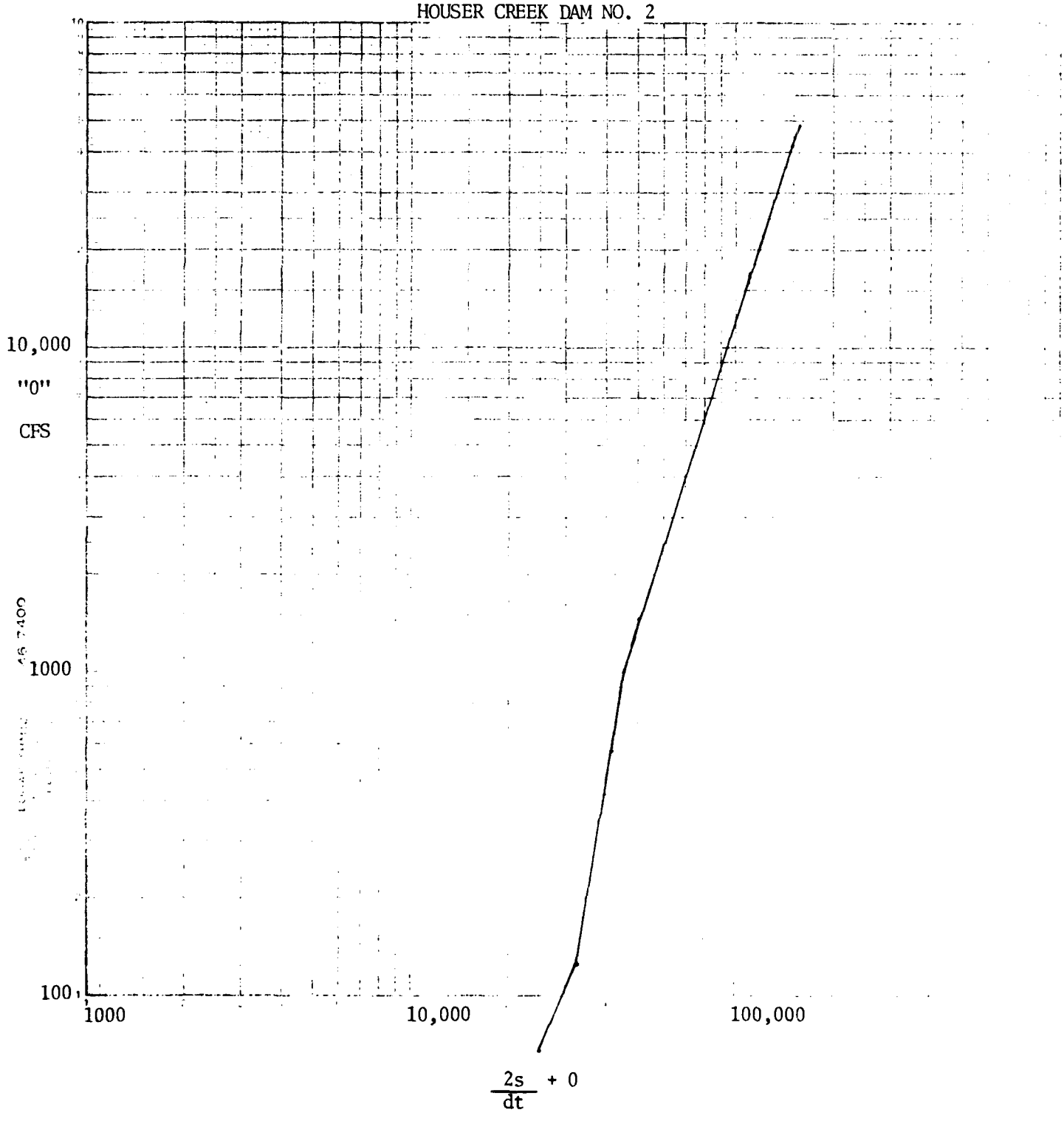
	(t / T_p) Rev. T_p	$(q_c / q_p) * Q * q_p$	$Q_t / Q)Q$
	t HOURS	q CFS	Q INCHES
1	0	0	0
2	.43	7	
3	.46	43	
4	.69	106	
5	.92	192	
6	1.16	262	
7	1.39	333	
8	1.62	440	
9	1.85	653	
10	2.08	1584	
11	2.31	2195	
12	2.54	1726	
13	2.77	1215	
14	3.00	881	
15	3.23	689	
16	3.47	576	
17	3.70	498	
18	3.93	434	
19	4.16	391	
20	4.39	356	
21	4.62	334	
22	4.85	320	
23	5.08	313	
24	5.31	306	
25	5.54	285	
26	5.78	242	
27	6.01	142	
28	6.24	57	
29	6.47	28	
30	6.70	14	
31	6.93	7	
32	7.16	0	
33		14,629	
34	check	14,629(.2)	= 4.0"

Wilbert Simmons & Associates, Inc
921 SOUTH BARKSDALE STREET P.O. BOX [illegible] MEMPHIS, TENNESSEE 38104
TELEPHONE 901 [illegible]

645 (1.14) ok

Systems Engineers

HOUSER CREEK DAM NO. 2



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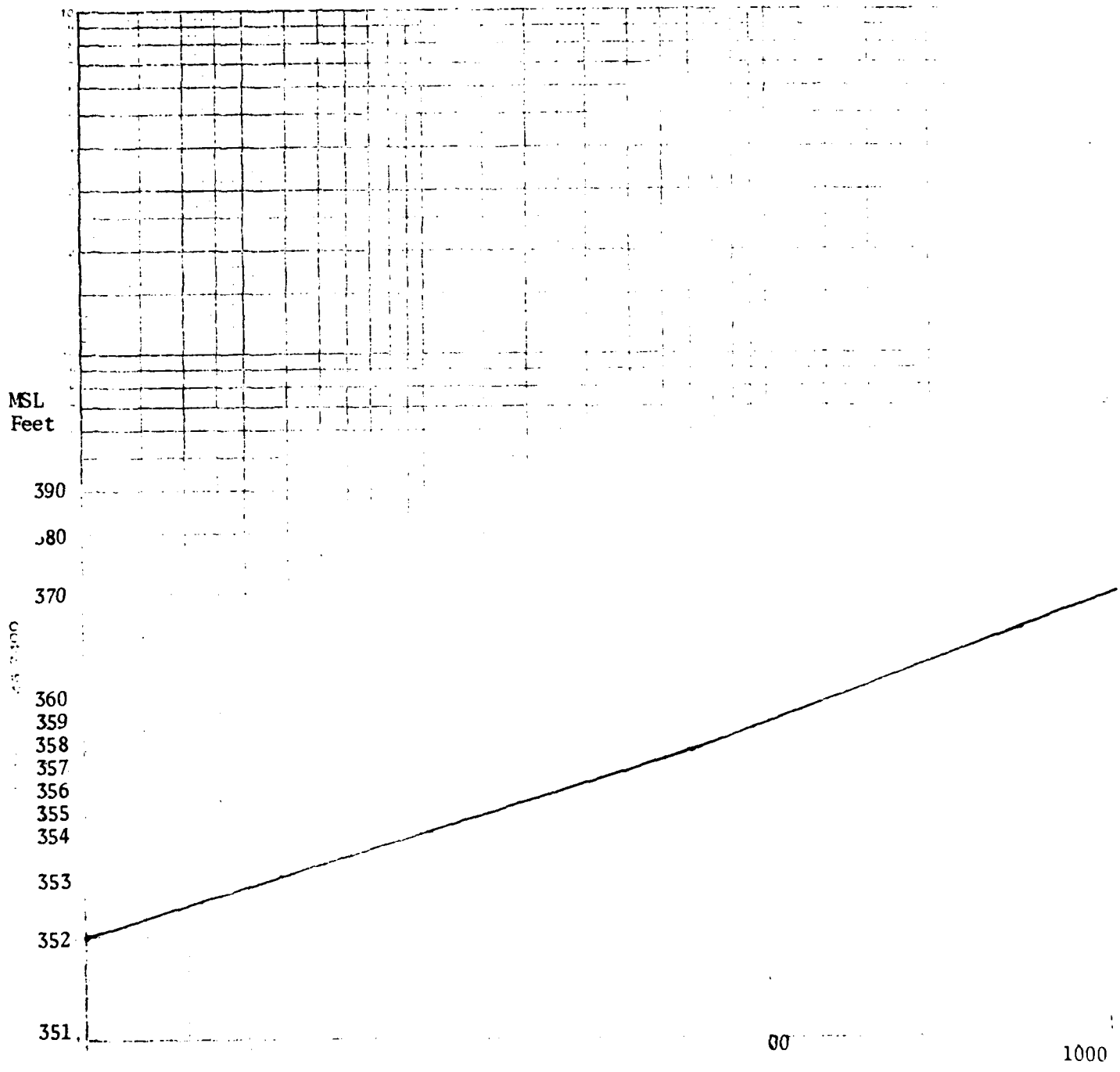
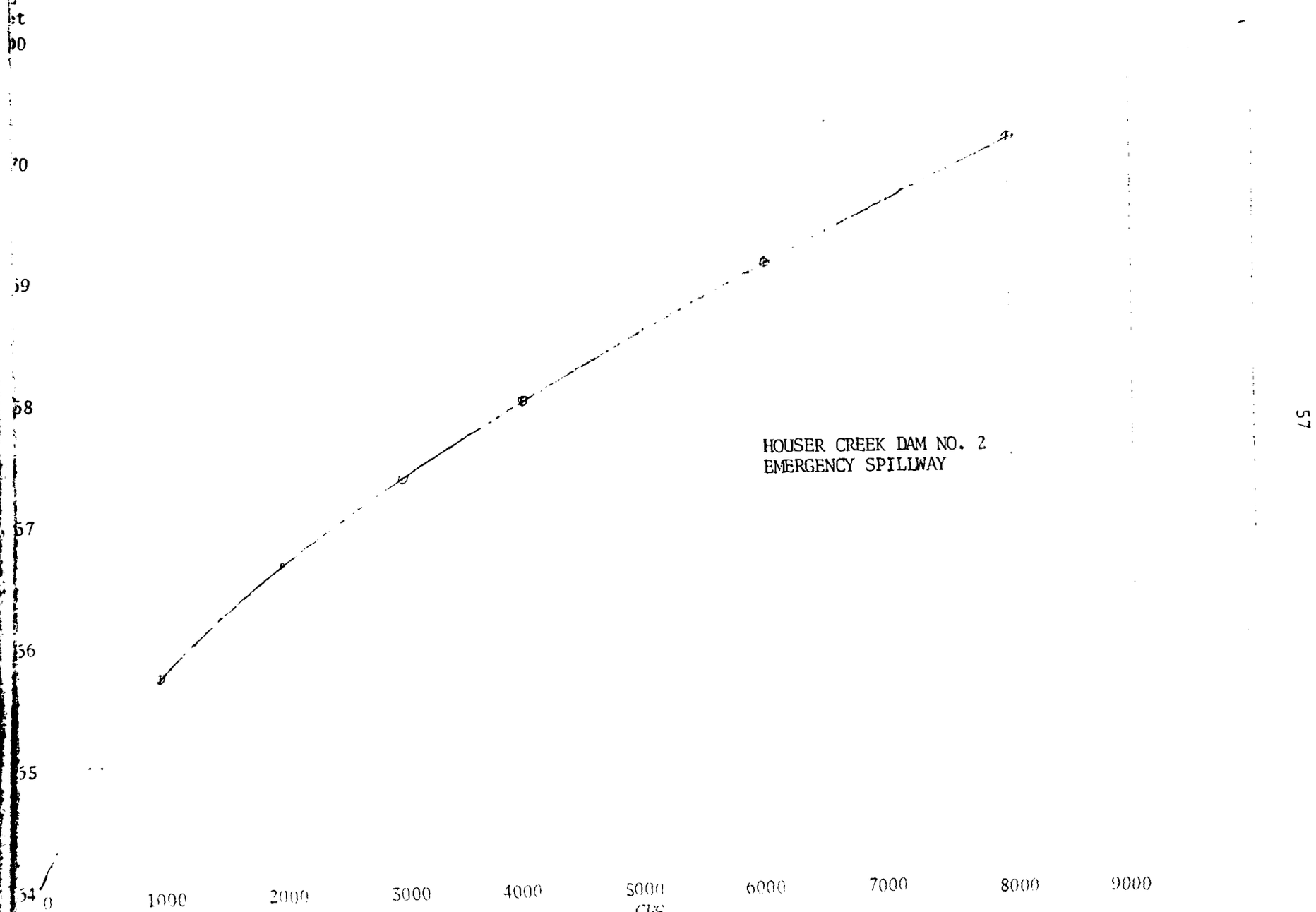
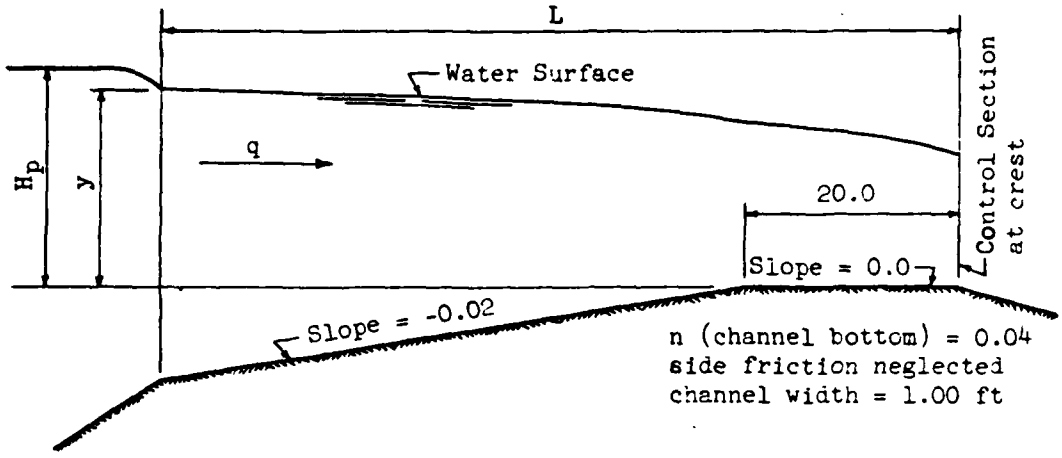


HOUSER CREEK DAM No. 2


HOUSER CREEK DAM NO. 2
EMERGENCY SPILLWAY
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
CFS

EARTH SPILLWAYS: Values of H_p and y for given values of q and L



H_p given in top figures; $y = H_p - v^2/2g$ given in bottom figures

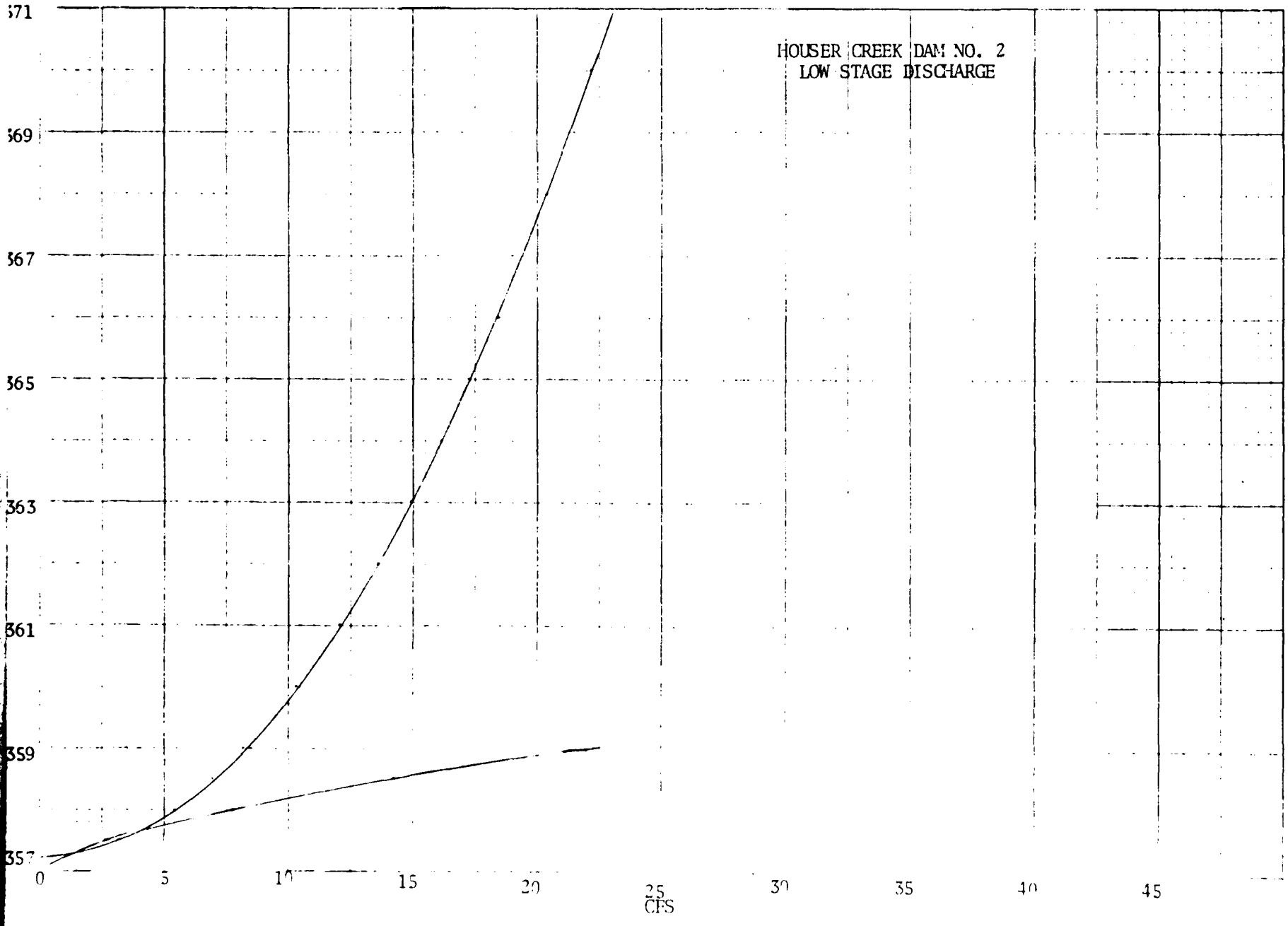
L in ft	q = 5 cfs	q = 10 cfs	q = 15 cfs	q = 20 cfs	q = 30 cfs	q = 40 cfs
20.0	1.58 1.37	2.40 2.02	3.09 2.55	3.68 2.98	4.75 3.76	5.72 4.47
40.0	1.65 1.55	2.49 2.27	3.19 2.86	3.79 3.34	4.86 4.20	5.83 4.96
60.0	1.68 1.61	2.53 2.38	3.23 2.99	3.84 3.51	4.93 4.41	5.90 5.21
80.0	1.70 1.65	2.55 2.43	3.27 3.08	3.89 3.62	4.97 4.55	5.95 5.38
100.0	1.71 1.67	2.57 2.48	3.30 3.14	3.91 3.69	5.01 4.65	5.99 5.50
120.0	1.72 1.69	2.59 2.51	3.31 3.18	3.93 3.74	5.03 4.72	6.02 5.59
140.0	1.72 1.70	2.61 2.54	3.33 3.21	3.95 3.79	5.05 4.78	6.04 5.66
160.0	1.73 1.71	2.61 2.56	3.34 3.24	3.96 3.82	5.07 4.83	6.06 5.72
180.0	1.73 1.71	2.62 2.57	3.34 3.26	3.98 3.85	5.09 4.87	6.08 5.78
200.0	1.73 1.72	2.62 2.58	3.34 3.27	3.98 3.87	5.09 4.90	6.10 5.82

REFERENCE	U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE ENGINEERING DIVISION · DESIGN SECTION	STANDARD DWG. NO. ES-124 SHEET 2 OF 7 DATE 11-21-56

EMERGENCY SPILLWAY CALCULATIONS SCS-ES 124 Sheet 2 of 7.

L = 200 ft. Control Sect. = 20 ft. Width = 200 ft.

Hp	MSL Elev.	Cfs/ft.	Total Cfs
1.73	365.73	5	1000
2.62	366.62	10	2000
3.34	367.34	15	3000
3.98	367.98	20	4000
5.09	369.09	30	6000
6.10	370.10	40	8000


ev.
371
369
367
365
363
361
359
357
0
5
10
15
20
25
30
35
40
45
CFS
HOUSER CREEK DAM NO. 2
LOW STAGE DISCHARGE

60

HOUSER CREEK DAM NO. 2 DISCHARGE

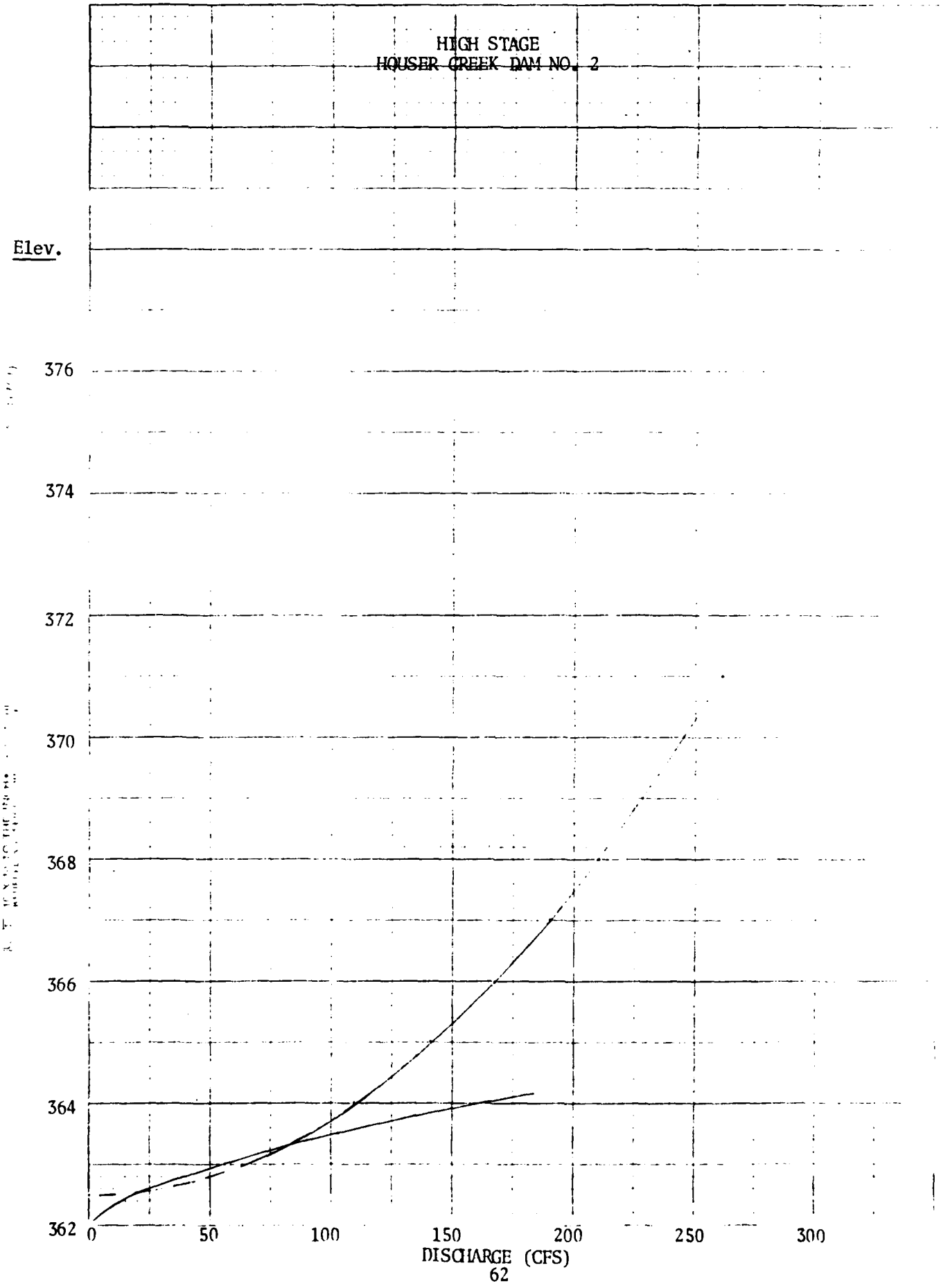
Low Stage
Invert Elev. 357.0'
0.5' x 2.5'

Weir Flow $Q = CLH^{3/2}$ $C = 3.1$ $L = 2.5$
$(Q = 7.75\ H^{1.5})$

Elev.	H	Q
357.0	0	0
357.5	.5	2.74
358.0	1.0	7.75
358.5	1.5	14.24
359.0	2.0	21.92

Orifice Flow $Q = CA\sqrt{2gh} = (.62)(1.25)\sqrt{64.4\ H}$
$= .775\sqrt{64.4H}$

Elev.	H	Q	Elev.	H	Q
357.25	0	0	366	8.75	18.40
357.50	.25	3.11	368	10.75	20.39
358.0	.75	5.39	370	12.75	22.21
359.0	1.75	6.95			
360.0	2.75	10.31			
361.0	3.75	12.04			
362.0	4.75	13.55			
363	5.75	14.91			
364	6.75	16.16			
365	7.75	17.31			


HIGH STAGE
HOUSER CREEK DAM NO. 2
Elev.
376
374
372
370
368
366
364
362
0
50
100
150
200
250
300
DISCHARGE (CFS)

High Stage
Inlet Elev. 362.0
9' x 1'

Weir Flow

$C = 3.1$ $L = 2 \times 9'$

$Q = CLH^{1.5} = 55.8\ H^{1.5}$

Elev.	H	Q
362.0	0	0
362.5	.5	19.73
363.0	1.0	55.8
363.5	1.5	102.51
364.0	2.0	157.83

Orifice Flow

$Q = 2(.62)(9' \times 1')\sqrt{64.4\ H}$

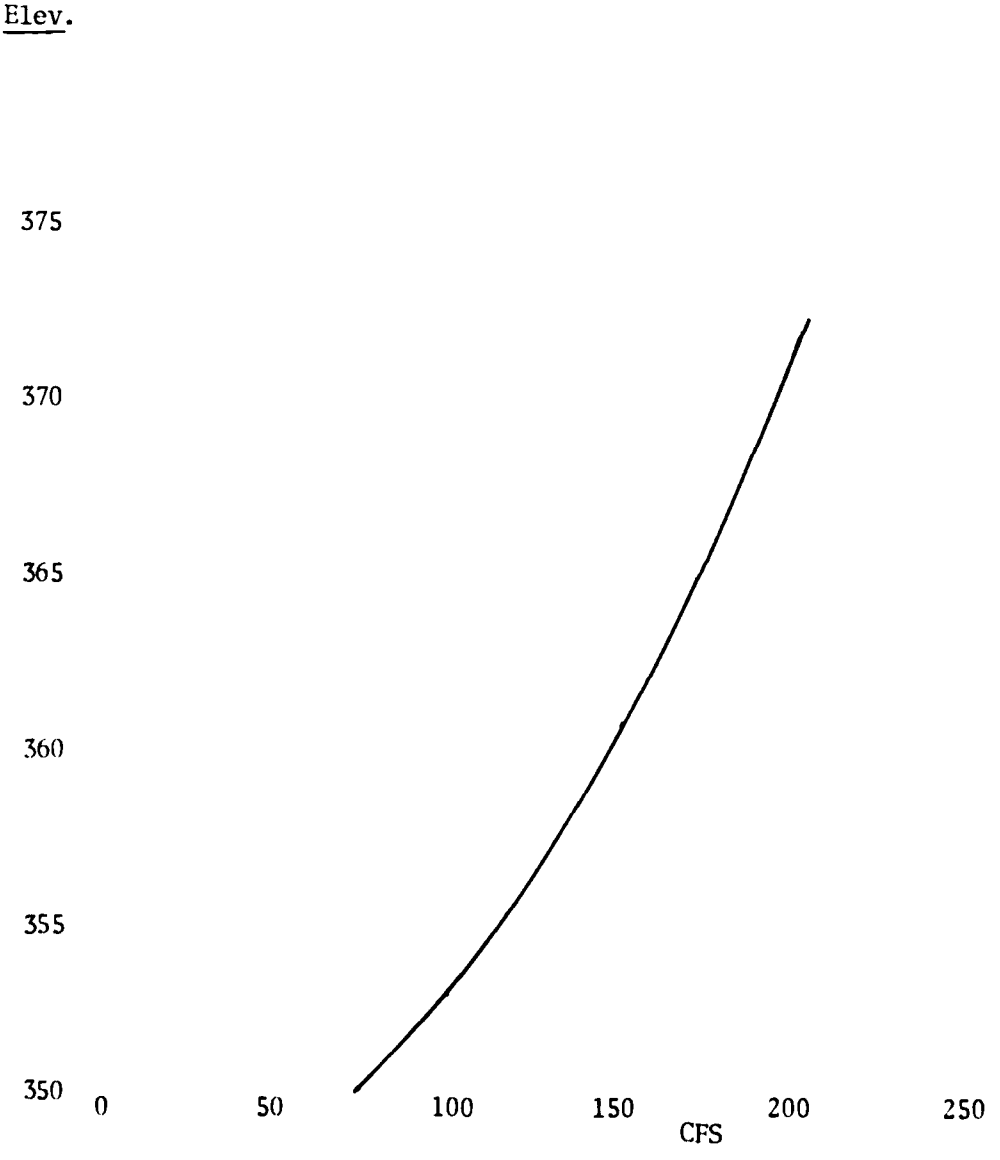
Elev.	H	Q
362.5	0	0
363	.5	63.33
364	1.5	109.69
365	2.5	141.60
366	3.5	167.55
367	4.5	189.98
368	5.5	210.03
368.5	6.0	219.4
369	6.5	228.33
370	7.5	245.27
371	8.5	261.11

HOUSER CREEK DAM NO. 2
PIPE DISCHARGE

Pipe Flow Calculations D = 36" Conduit K_f = 0.00616
Riser K_f = 0.00421
Entrance Loss = 1.0 $V^2/2g$

$$H = 14 \times 0.00421 \times V_R/2g + V_p/2g + 158 \times 0.00616 \times V_p/2g$$

Assume	75 cfs	V_p = 10.61	V_R = 2.78	H = 3.46 ft.	349.96
	100 cfs	V_p = 14.14	V_R = 3.704	H = 6.13 ft.	352.63
	150 cfs	V_p = 21.22	V_R = 5.55	H = 13.83 ft.	360.33
	200 cfs	V_p = 28.29	V_R = 7.41	H = 24.57 ft.	371.07



APPENDIX F

DAM INVENTORY DATA SHEET

DAM INVENTORY DATA SHEET
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

ID NUMBERS STATE(ID): 66-7015 FEDERAL(FED ID): TN-13114

NAME(PROJECT): Houser Creek Dam #2 REGION(R): West

OWNER(S): Dr. W. B. Dunlap Sr.

ADDRESS: 1301 Armstrong, Union City, TN 38261

TELEPHONE RESIDENCE: 885-~~5743~~ 2694 BUSINESS: 885-5312

COUNTY: Obion QUAD: 427NE-Union City

LOCATION LATITUDE: 36° 26' 45", LONGITUDE: 89° 05'- 52"

STREAM(SOURCE): Trib. Houser Creek RIVER MILE: BASIN: 30C

PURPOSE OF DAM: Flood control YEAR COMPLETE: 1964

CONTRACTOR(CONT): Holt Construction LOCATION: Milan, TN

ENGINEER(ENG): SCS LOCATION: Nashville, TN

TYPE OF DAM(TYC): Earth SIZE CLASSIFICATION: Small

DOWNSTREAM HAZARD POTENTIAL CLASSIFICATION STATE(H) 1 FEDERAL(FH) High

CERTIFICATE EXPIRATION DATE(EXP DATE):

STRUCTURAL HEIGHT(SHT): 26.5 FEET, HYDRAULIC HEIGHT(HHT): 15? FEET

CREST LENGTH(LGTH): 1350 FEET, CREST WIDTH(WDTH): 14 FEET

USTREAM SLOPE(U/S): 3 :1, DOWNSTREAM SLOPE (D/S): 3 :1

POOL AREA NORMAL(NSURF): 23.? ACRES, MAXIMUM(M/SURF): 112 ACRES

	ELEVATION(FEET MSL),	STORAGE CAPACITY(ACRE-FEET)
TOP OF DAM	(ELEV1) 368.5 ,	(TO/STR) 894
EMERGENCY SPILLWAY CREST	(ELEV2) 364.0 ,	(EM/STR) 468
NORMAL POOL	(ELEV3) 357.0 ,	(N/STR) 114

EMERGENCY SPILLWAY MATERIAL(ESM) Veg earth , SIZE(SZ) 200'

SERVICE SPILLWAY MATERIAL(SSM) RC riser, skirted SIZE(SZ) 3' x 3'

DRAINAGE AREA(DA): 730 1.14 SQ. MILES, CURVE NUMBER(CN): 85 AMCII

TIME OF CONCENTRATION(TC): HOURS, MAXIMUM 6-HR RAIN: 20.23 INCHES

COMMENTS: INVENTORIED BY: George Moore DATE: 1/8/81

REVISED BY: DATE: D/S HAZARD BY: Moore DATE: 1/8/81

OTHER NAME OF PROJECT: EVERETT POOL AREAS OBTAINED BY: As built plans

OTHER CONTACT AT DAM: [illegible] PHONE: 885-[illegible]

DATA OBTAINED FROM: As built plans

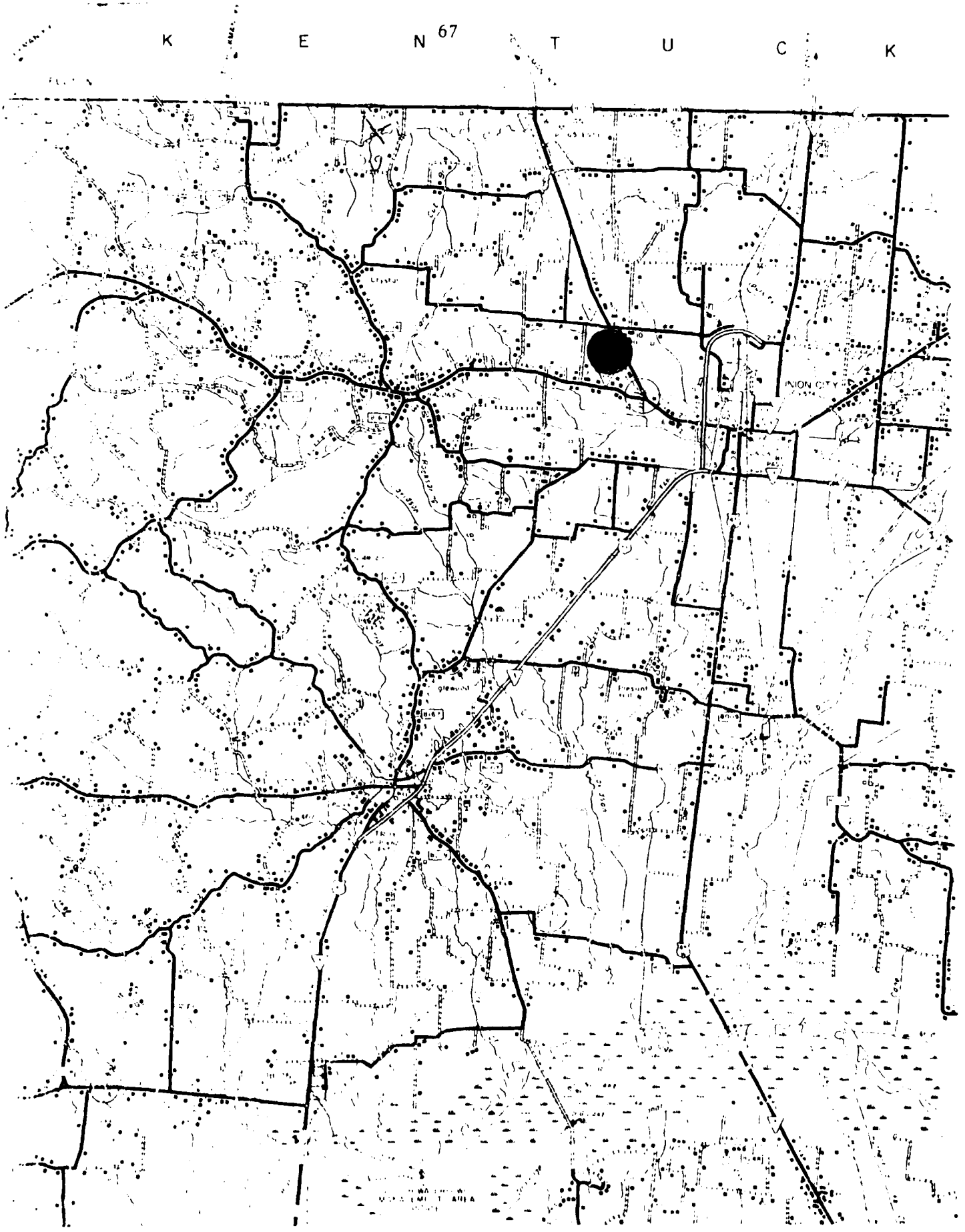
EMER. SPIL. DESC.: 3:1 side slopes; 20' control section

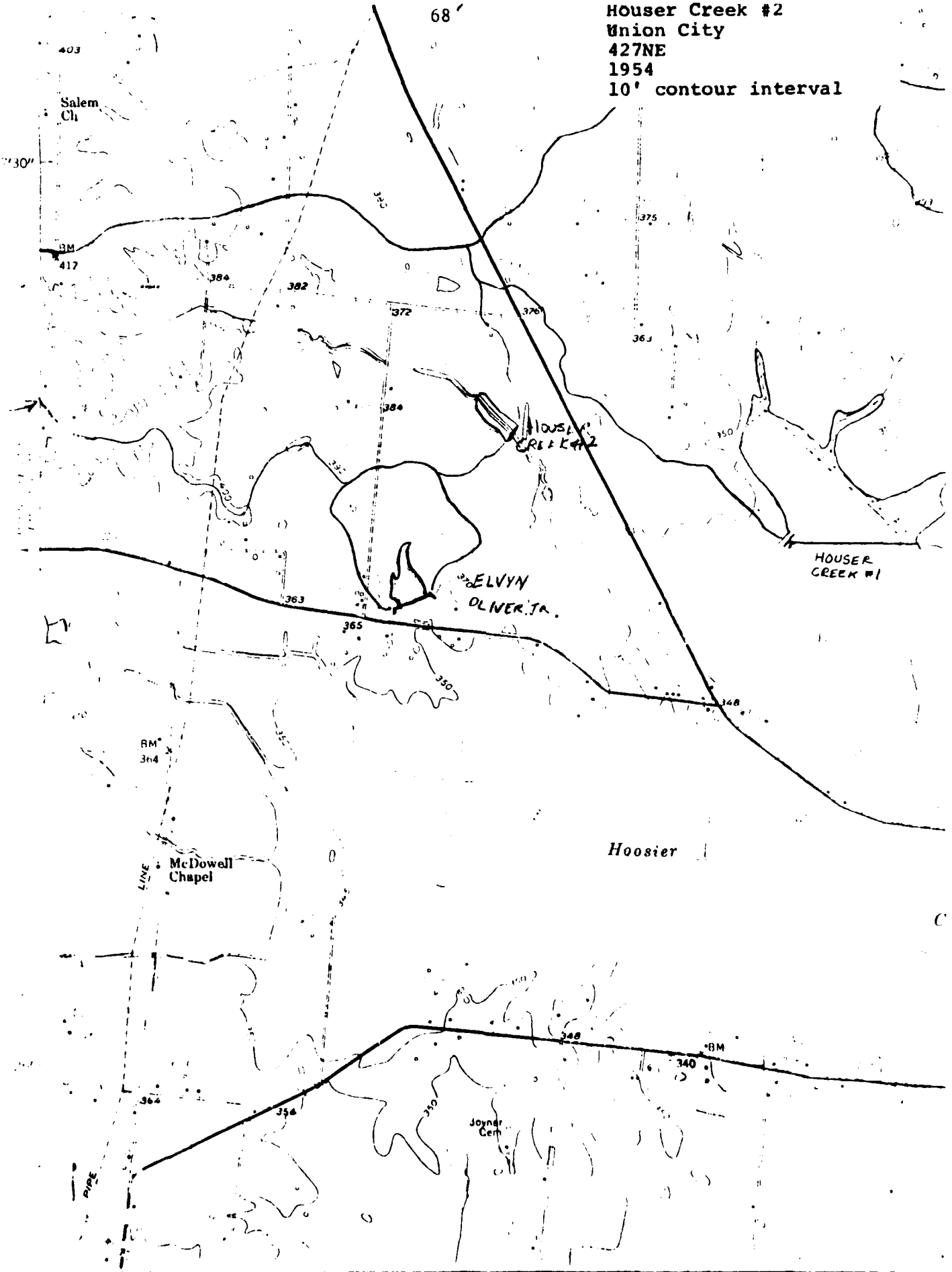
SERV. SPIL. DESC.: 150' @ 36" RC pipe

ELEVATIONS REF. TO: APPROX ELEV: FT MSL

DRAWDOWN DRAIN: MATERIAL: Slide gate on riser SIZE: 24" dia ELEVATION: 340.0

OTHER COMMENTS: Normal pool elev at high stage is 362.0. Outlet elev 345.0; Outlet channel elev 362.0; lowest point keyway 340.0; Vol of fill 54,200


K E N 67 T U C K
UNION CITY


68
Houser Creek #2
Union City
427NE
1954
10' contour interval
Salem Ch
BM 417
HOUSER CREEK #2
ELVYN OLIVER JR.
HOUSER CREEK #1
BM 364
McDowell Chapel
Hoosier
Joyner Cem
BM 340

TENNESSEE DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES
Suite 402 A, Box 42
225 Madison Avenue
Jackson, Tennessee 38301
901/424-3051

M E M O R A N D U M

TO: Files

FROM: George Moore

SUBJECT: Houser Creek Dam #2

DATE: August 11, 1981

During a phone conversation on April 27, 1981, Dr. W. B. Dunlap stated that the lake area behind Houser Creek Dam #2 had filled with sediment and trees were growing in the lake area and on the dam. Dr. Dunlap expressed dissatisfaction with the condition of the lake and dam and stated that he would appreciate any assistance we might be able to give in prompting the appropriate officials to undertake the needed remedial work.

GM:lt

cc: Bill Bush ✓

ORNED-G

NON-FEDERAL DAM INSPECTION REVIEW BOARD
PO BOX 1070
NASHVILLE, TENNESSEE 37202

Commander, Nashville District
US Army Corps of Engineers
PO Box 1070
Nashville, TN 37202

1. The Interagency Review Board, appointed by the Commander on 19 June 1981, presents the following recommendations after meeting on 6 August 1981, to consider the Phase I investigation report on Houser Creek Dam No. 2 performed by Winsett-Simmonds, Consterdine & Associates, Inc., under contract to the Tennessee Department of Conservation.

2. In Section 3.1.1, the paragraph on Geology should be expanded to include a more detailed description of the geology of the area.

3. The condition classification should be changed from "deficient" to "significantly deficient."

4. The Board is in agreement with other report conclusions and recommendations following minor revisions.

FRANK B. COUCH, JR.
Chief, Geotechnical Branch
Chairman

O'GENE W. BARKEMEYER
State Conservation Engineer
Soil Conservation Service

ROBERT A. HUNT
Director, Division of Water Resources
State of Tennessee

THOMAS N. PORTER
Hydraulics Engineer
Alternate, Hydrology and Hydraulics Branch

EDWARD B. BOYD
Hydrologic Technician
Alternate, US Geological Survey

L. E. LOCKETT
Structural Engineer
Alternate, Design Branch

APPENDIX G

USDA-SCS
ANNUAL INSPECTION REPORT

TN-WS-6 (Rev. 1)
2-78

USDA-SCS

ANNUAL MAINTENANCE INSPECTIONS - FLOODWATER RETARDING STRUCTURES

WATERSHED Houser Creek SITE NO. 2

LOCATION Approx. 2.5 miles NW of Union City Just West of St. HWY No. 5 INSPECTION DATE 5/27/80

A. EMBANKMENT

1. Type and condition of vegetation Fescue-good in open areas, poor where woody growth is on dam
2. Is woody growth present? Yes
3. Are cracks present? No
4. Has sliding occurred? No
5. Are irregularities caused by settlement evident? No
6. Are eroded areas or gullies present? No
7. Is toe or area below dam wet? No
8. Are concentrated leaks present? No
9. If wetness or leaks are present, explain changes since last inspection None evident
10. Are sinks present in vicinity of dam? None evident
11. Condition of berm and areas subject to wave erosion Not visible-under water
12. Is dispersion (jugging) evident? No
13. Floating debris from reservoir Yes

B. PRINCIPAL SPILLWAY

1. Condition of trash racks Good
2. Debris lodged in openings No
3. Indications of cracks in riser or conduit None visible

4. Condition of concrete (riser, bent & impact basin) Portion that is visible is good

5. Is manhole cover in place? Yes

6. Condition of gates Not visible - under silt

C. STILLING BASIN AND OUTLET CHANNEL

1. Type and condition of vegetation Fescue - good

2. Is stilling basin eroding? Yes - sloughing

3. Are banks of outlet channel stable? Yes

4. Is outlet channel degrading? Some - stable now

5. Is channel free of obstructions? vegetative growth

6. Boils in stilling basin or outlet channel? None evident

7. If boils are present, is there an accumulation of soil or sand around boil? none evident

8. If leakage is evident, is it clear? none evident

9. Condition of riprap none

D. FQUNDATION DRAIN

1. Iron oxide deposits on pipe? Yes slight

2. Other blockages in pipe? None

3. Condition of animal guards Good

4. Flow from pipe (none, trickle, moderate or strong) Trickle

5. Sand or silt in discharge? No

E. EMERGENCY SPILLWAY

1. Type and condition of vegetation Fescue - good

2. Erosion? slight

3. Do roads cross or go through spillway which will concentrate flow or contribute to erosion? Road crosses but does not appear to contribute to erosion.
4. Are fences present which will obstruct flow? No
5. Has spillway been altered? No
6. Woody growth that could obstruct flow? Willows are in entrance to spillway

F. BORROW AREA

1. Type and condition of vegetation Fescue - good
2. Erosion? very little

G. RESERVOIR

1. Shoreline wave erosion? Shoreline inundated
2. Woody growth? Willow bushes up to 6" in diameter cover at least half of reservior area
3. Floating debris? Yes
4. Sinks or holes? None evident

H. FENCES

1. Condition of fences N/A

I. MISCELLANEOUS

1. Has land use in watershed changed enough since structure was designed to alter runoff significantly? Yes - more cultivated land
2. Has land use in the flood plain below the dam changed enough since design to alter hazard classification? Some houses have been built in flood plain below dam

J. CONCLUSIONS AND RECOMMENDATIONS

Sediment pool is almost filled with silt. Very little silt storage remaining. Sediment pool is grown up in willow trees. Dam is almost completely covered with small trees. These are almost too large to bush hog. They need to be cut.

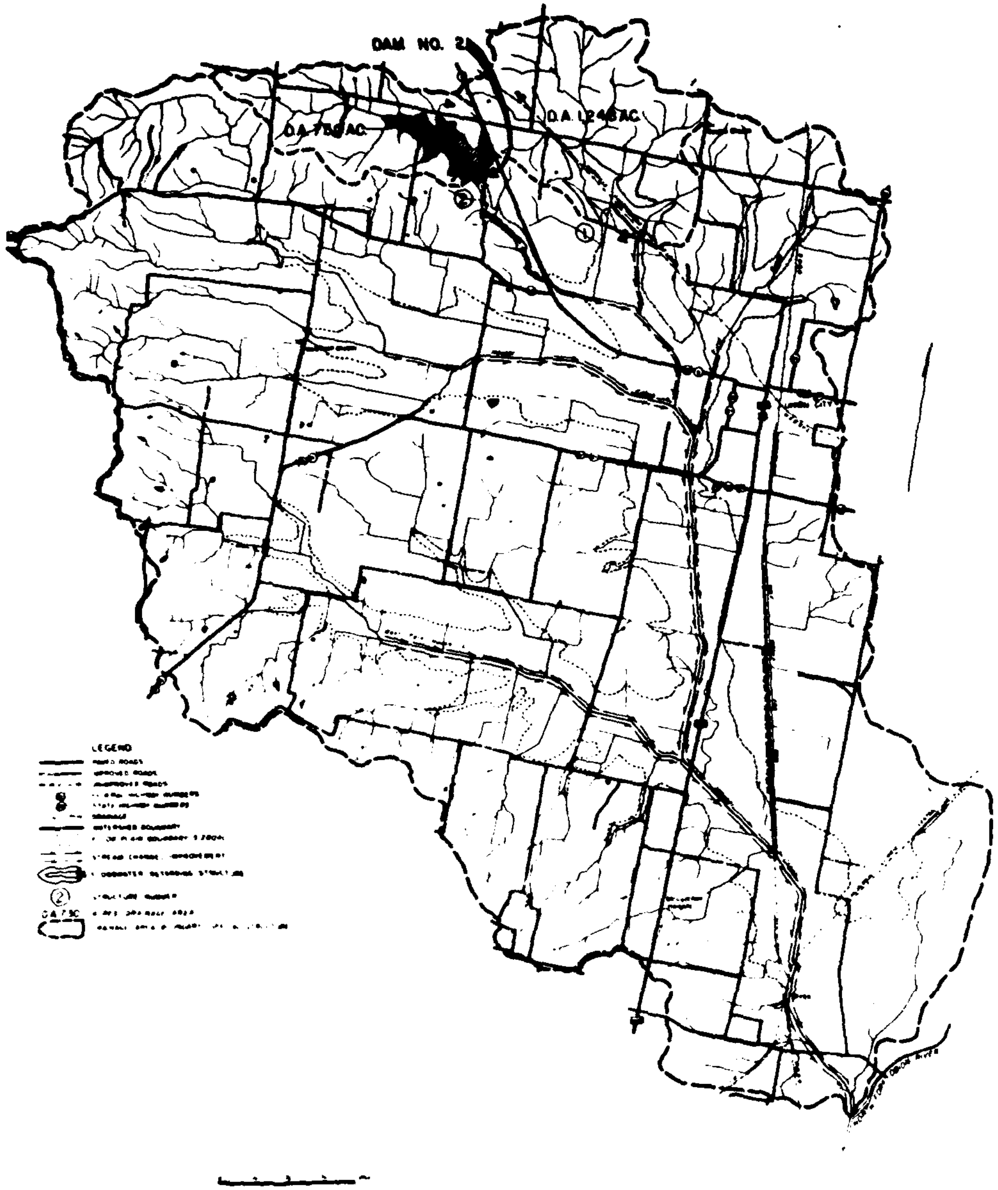
Inspected by: _____ Date: 5/27/80
Sponsor Representative

Inspected by: Hoyle A. Tucker Date: 5/27/80
SCS Representative

Name and title of others assisting with inspection:

APPENDIX H

AS-BUILT PLANS



FLOOD ROUTING DATA

STRUCTURE CLASS C (SCS-27)

DRAINAGE AREA 732 ACRES

ITEM	PRIN. SPW	EMER. SPW	FREEBOARD
Runoff Vol. (Inches)	8.54	10.6	23.23
Curve No.	83	83	83
Rainfall Source	EWP-5	6 hr. P	[illegible]
Hyd. Time Base	48 hrs	6 hrs	[illegible]
Flood Routed Elev.	364.1	365.5	[illegible]

LETTER OF APPROVAL
S/ L. F. SILBERBERGER
OCT. 17, 1962

AS BUILT 8934 1

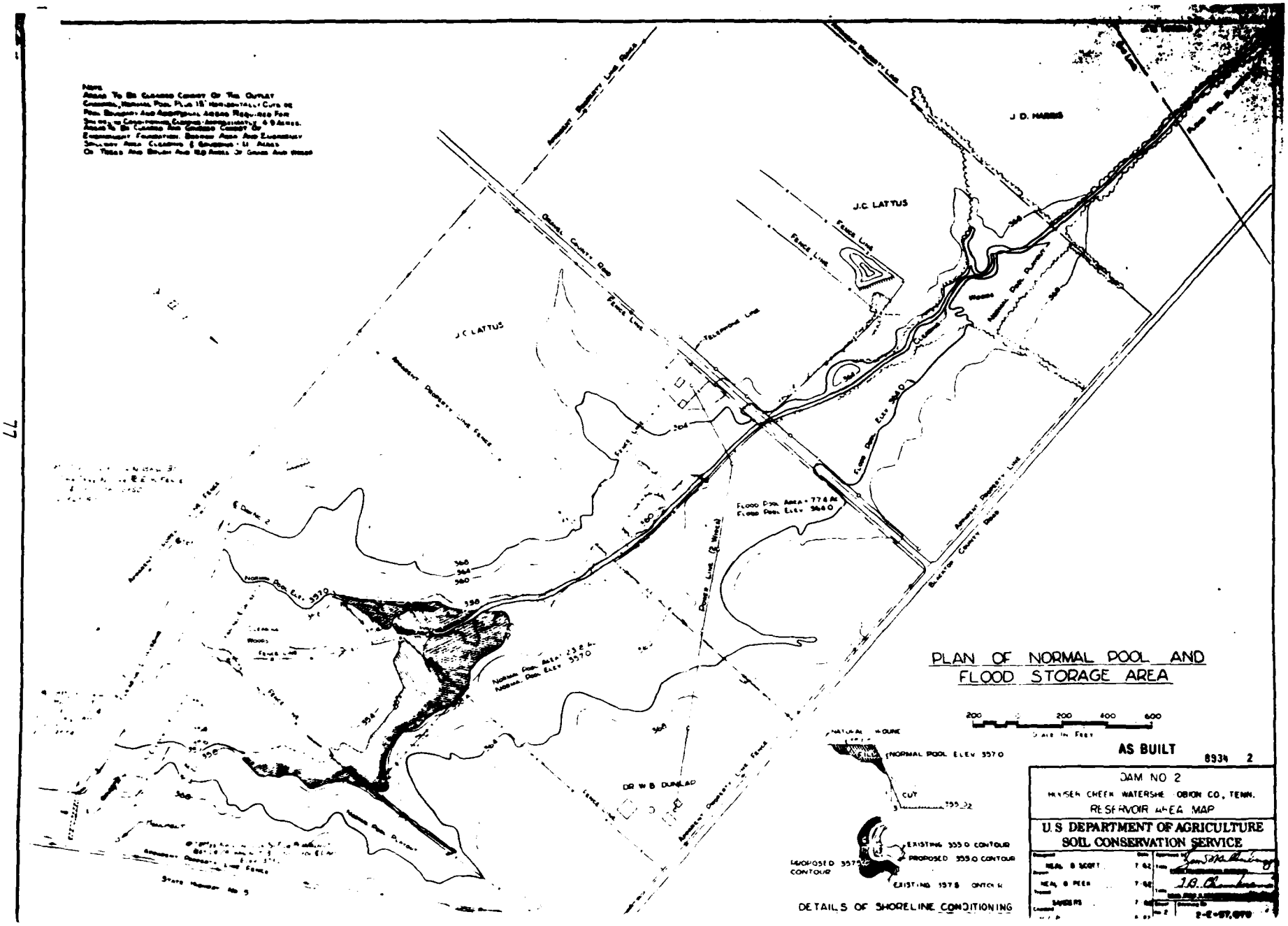
DAM NO. 2

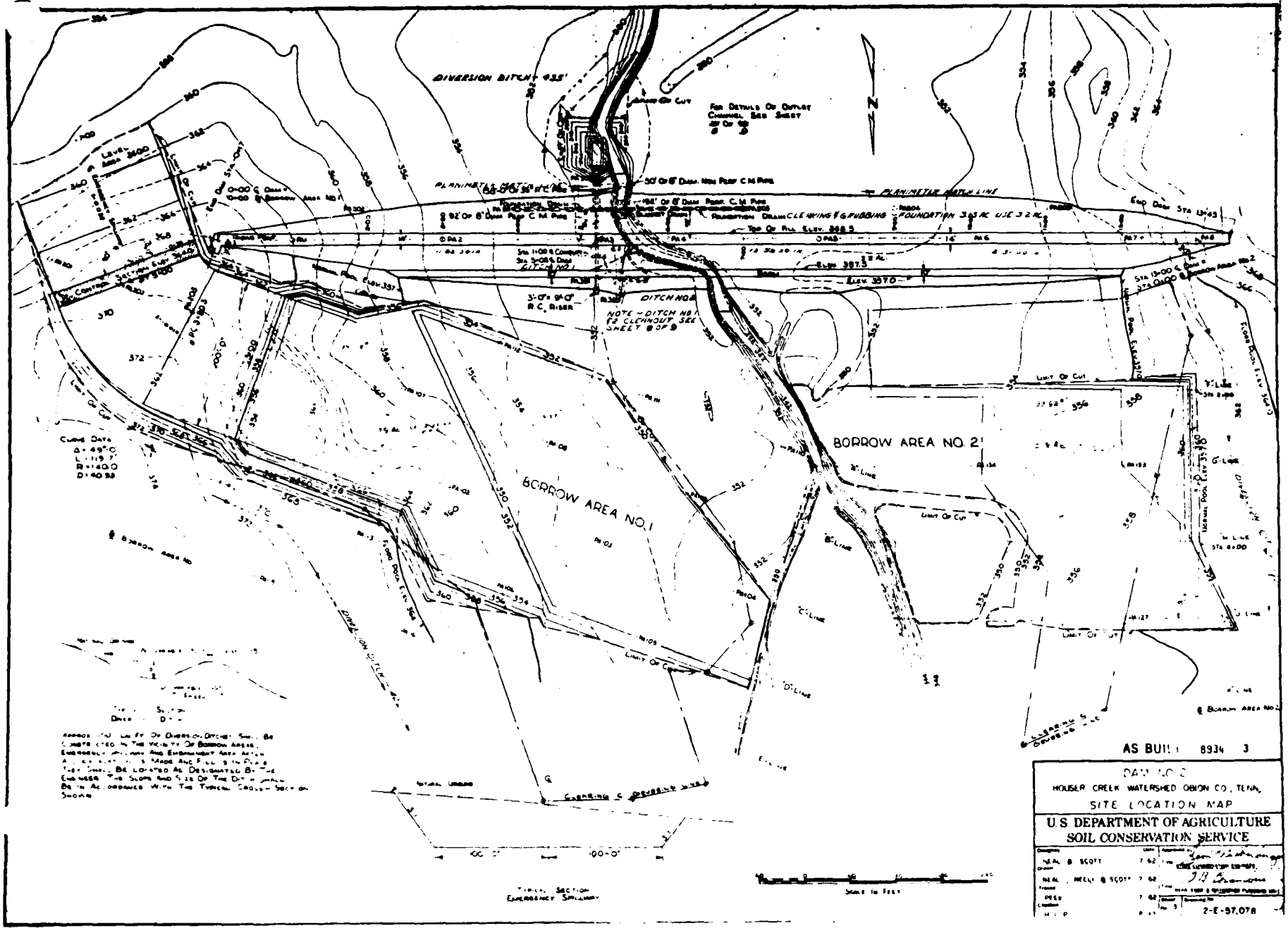
HOUSER CREEK WATERSHED - OBION CO., TENN.

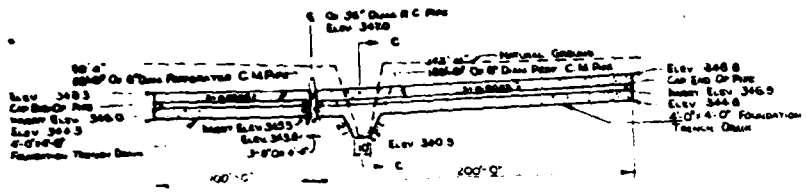
STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

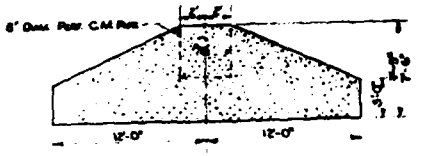
2-E-37,078


J. D. HARRIS
J.C. LATTUS
J C LATTUS
DR W B DUNLAP
Flood Pool Area = 77.6 Ac
Flood Pool Elev 3560
Normal Pool Elev. 3570
Normal Pool Area = 23.6 Ac
Normal Pool Elev 3570
PLAN OF NORMAL POOL AND
FLOOD STORAGE AREA
200 0 200 400 600
SCALE IN FEET
AS BUILT
8934 2
(NORMAL POOL ELEV 3570
CUT
EXISTING 3550 CONTOUR
PROPOSED 3550 CONTOUR
PROPOSED 3570 CONTOUR
DETAILS OF SHORELINE CONDITIONING
DAM NO 2
WATERSHED OBION CO., TENN.
RESERVOIR AREA MAP
U.S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

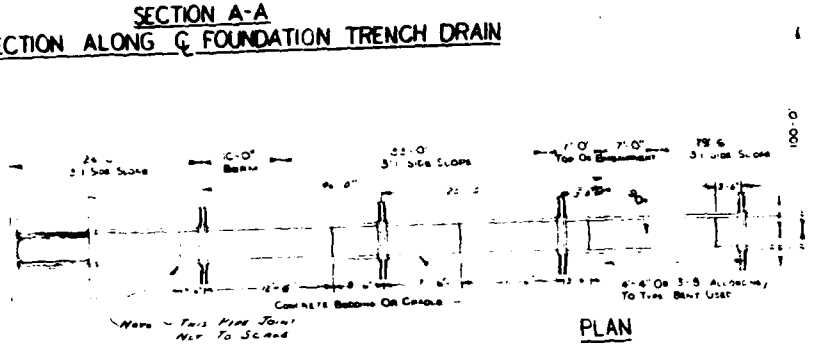

DIVERSION DITCH #3
BORROW AREA NO. 1
BORROW AREA NO. 2
DITCH NO 8
AS BUILT 8934 3
DAM NO 2
HOUSER CREEK WATERSHED OBION CO., TENN.
SITE LOCATION MAP
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
2-E-57,078



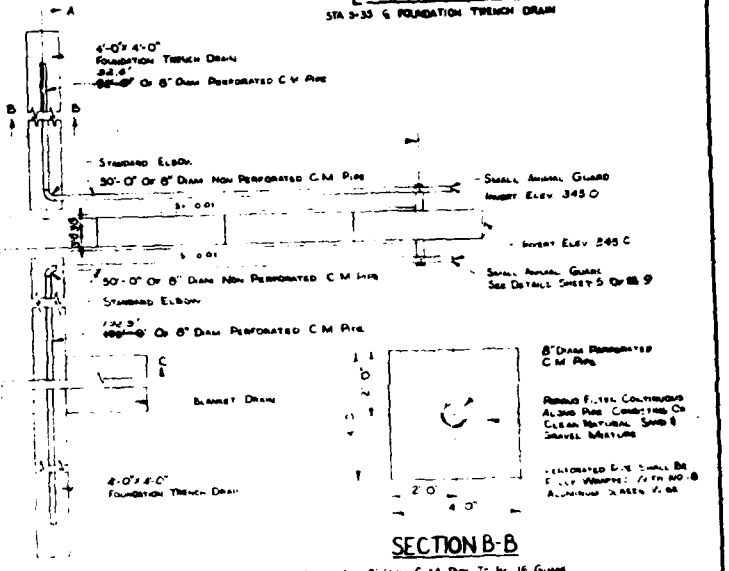
SECTION A-A
SECTION ALONG ℄ FOUNDATION TRENCH DRAIN



SECTION C-C
℄ BLANKET DRAIN



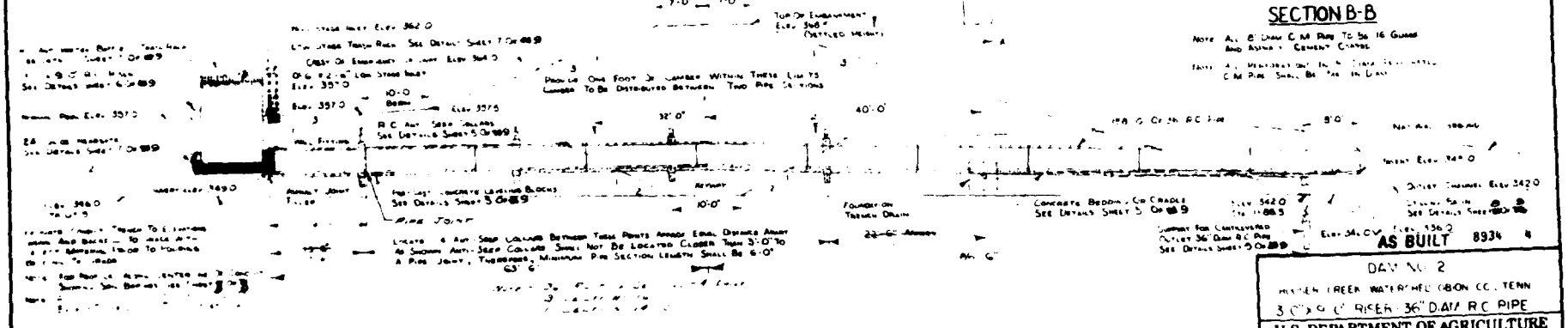
PLAN



SECTION B-B

FILTER GRADATION USED

SIEVE SIZE	% PASSING
1½	100
#4	85-100
#10	70-95
#20	40-75
#30	5-60
#100	0-15
#200	0-5



SECTION ALONG CENTERLINE OF 36" DIAM. REINFORCED CONCRETE PIPE
STA. 5+05 ℄ DAM

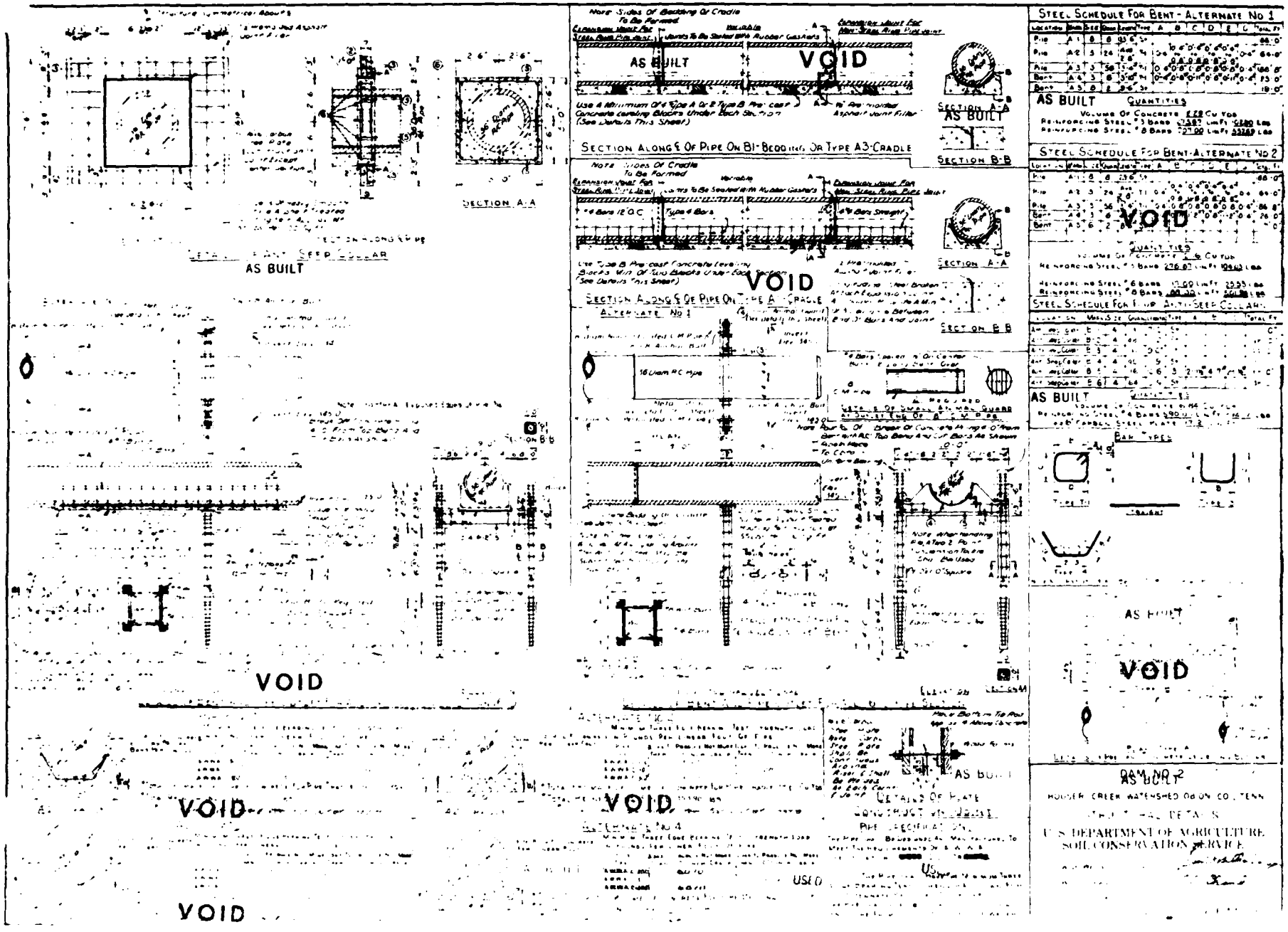
AS BUILT 8934

DAM NO. 2
HIDDEN CREEK WATERSHED GIBSON CO., TENN
3.0 CFS ℄ RISER - 36" DIAM. R.C. PIPE
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

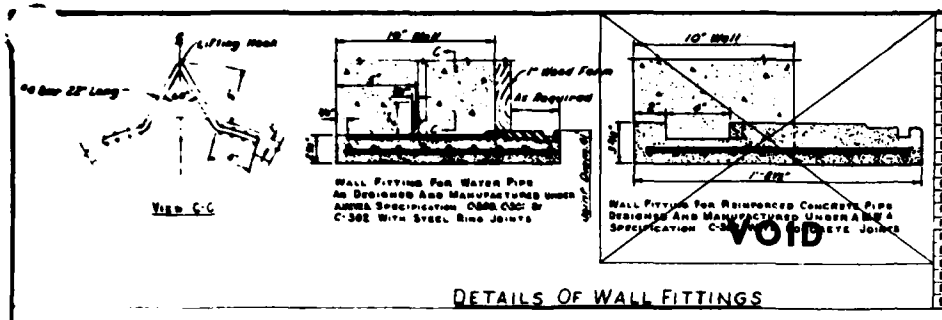
NEAL & SCOTT
PETER
PETER
HEP

2-E-57,078

79


AS BUILT
VOID
SECTION A-A
SECTION B-B
SECTION ALONG ℄ OF PIPE ON BI-BEDDING OR TYPE A3-CRADLE
STEEL SCHEDULE FOR BENT - ALTERNATE NO 1
STEEL SCHEDULE FOR BENT - ALTERNATE NO 2
STEEL SCHEDULE FOR FLAP ANTI-SEEP COLLAR
AS BUILT QUANTITIES
VOID
VOID
VOID
VOID
VOID
AS BUILT
DETAILS OF PLATE
DAM NO 2
HOOVER CREEK WATERSHED OBION CO., TENN
STRUCTURAL DETAILS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

80



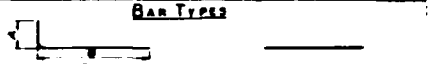
Steel Schedule

Location	Mark	Size	Quan.	Length	Type	A	B	Total Feet
Floor	C-1	5	22	7'-3"	St			159'-6"
Floor	C-2	5	10	10'-3"	St			102'-6"
Floor & Riser	C-3	4	24	9'-9"	2	1'-9"	6'-0"	282'-0"
Floor & Riser	C-4	4	10	7'-8"	2	1'-9"	4'-6"	114'-0"
Riser	C-5	5	10	10'-3"	St			102'-6"
Riser	C-6	8	10	6'-6"	2	0'-6"	6'-0"	65'-0"
Riser	C-7	4	10	8'-0"	St			80'-0"
Riser	C-8	4	18	5'-3"	St			95'-6"
Riser	C-9	5	22	8'-0"	2	3'-0"	8'-0"	198'-0"
Riser	C-10	4	14	7'-6"	St			105'-0"
Riser	C-11	4	16	8'-0"	St			119'-0"
Riser	C-12	4	12	10'-3"	St			123'-0"
Riser	C-13	4	20	8'-0"	St			151'-0"
Riser	C-14	4	6	6'-0"	2	5'-0"	6'-0"	36'-0"
Riser	C-15	4	30	9'-8"	2	1'-9"	6'-0"	163'-6"
Baffle Wall	C-16	4	4	7'-0"	St			28'-0"
Baffle Wall	C-17	4	4	7'-9"	St			31'-0"
Baffle Wall	C-18	4	4	9'-9"	St			39'-0"
Baffle Wall	C-19	4	4	11'-0"	St			44'-0"
Baffle Wall	C-20	4	8	12'-3"	St			98'-0"
Location	Mark	Size	Quan.	Length	Type	A	B	Total Feet
Baffle Wall	C-21	4	6	9'-0"	St			54'-0"
Baffle Wall	C-22	4	4	9'-0"	St			36'-0"
Baffle Wall	C-23	4	8	9'-0"	St			72'-0"
Baffle Wall	C-24	4	4	9'-0"	St			36'-0"
Baffle Wall	C-25	4	4	9'-0"	St			36'-0"
Baffle Wall	C-26	4	4	4'-6"	St			18'-0"
Baffle Wall	C-27	4	4	9'-0"	St			36'-0"
Baffle Wall	C-28	4	8	5'-6"	St			44'-0"

Quantities

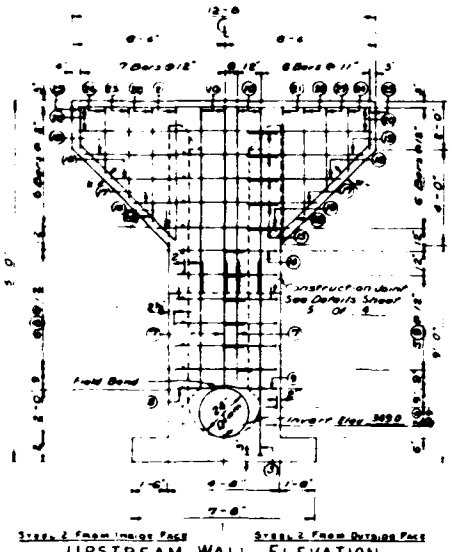
Reinforcing Steel #4 Bars	[illegible]	Lin. Ft.
Reinforcing Steel #5 Bars	[illegible]	Lin. Ft.
Volume Of Concrete	[illegible]	Cu. Yds.
5/16" Carbon Steel Plate	[illegible]	Lin. Ft.

Bar Types

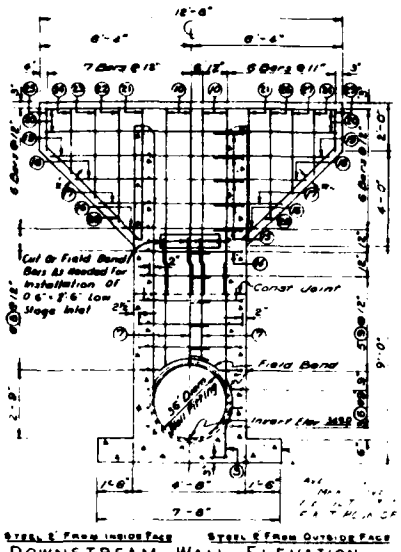


Note: Minimum Radius Of All Bends To Be 6 Times Bar Diameter

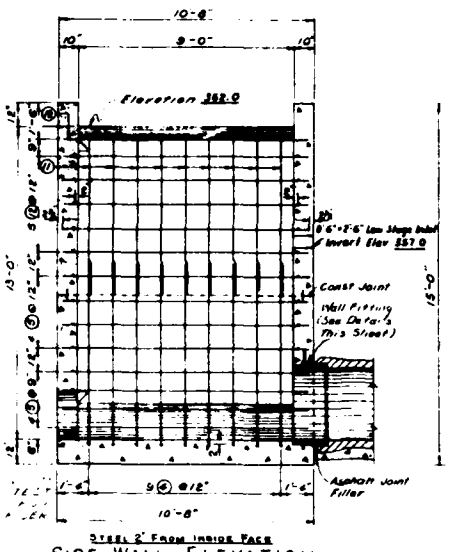
Details Of Wall Fittings



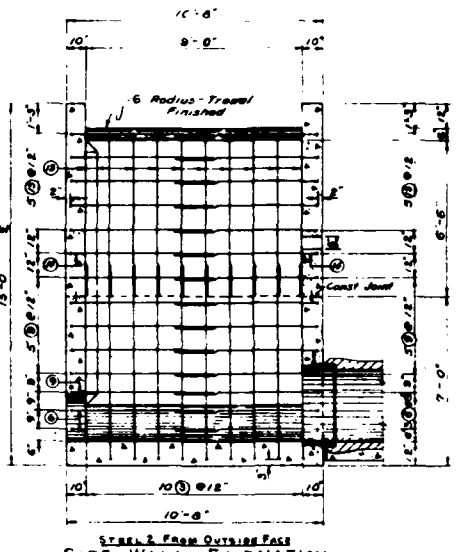
Upstream Wall Elevation



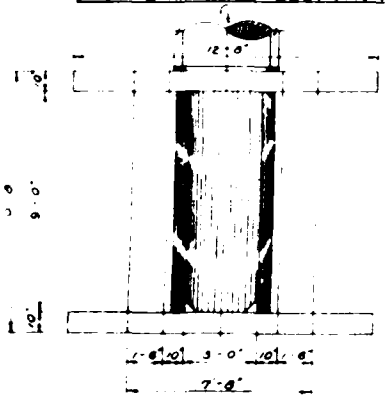
Downstream Wall Elevation



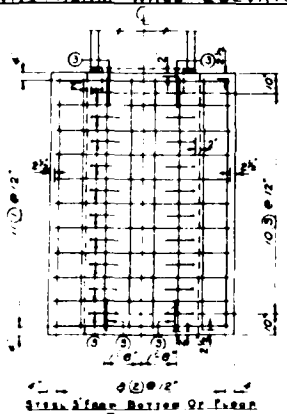
Side Wall Elevation



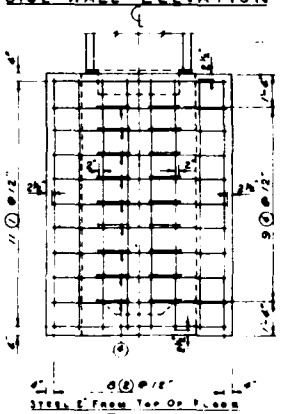
Side Wall Elevation



Plan



Plan



Plan

Note: Structure Is Symmetrical About ℄
Chamfer All Exposed Edges ¾"
All Fillets Are 6"
For Details Of Anti-Vortex Baffle See Sheet 7 Of 9
For Details Of Headgate See Sheet 7 Of 9

AS BUILT

DAM NO. 2 8934 6

HOUSER CREEK WATERSHED-OBION CO., TENN.

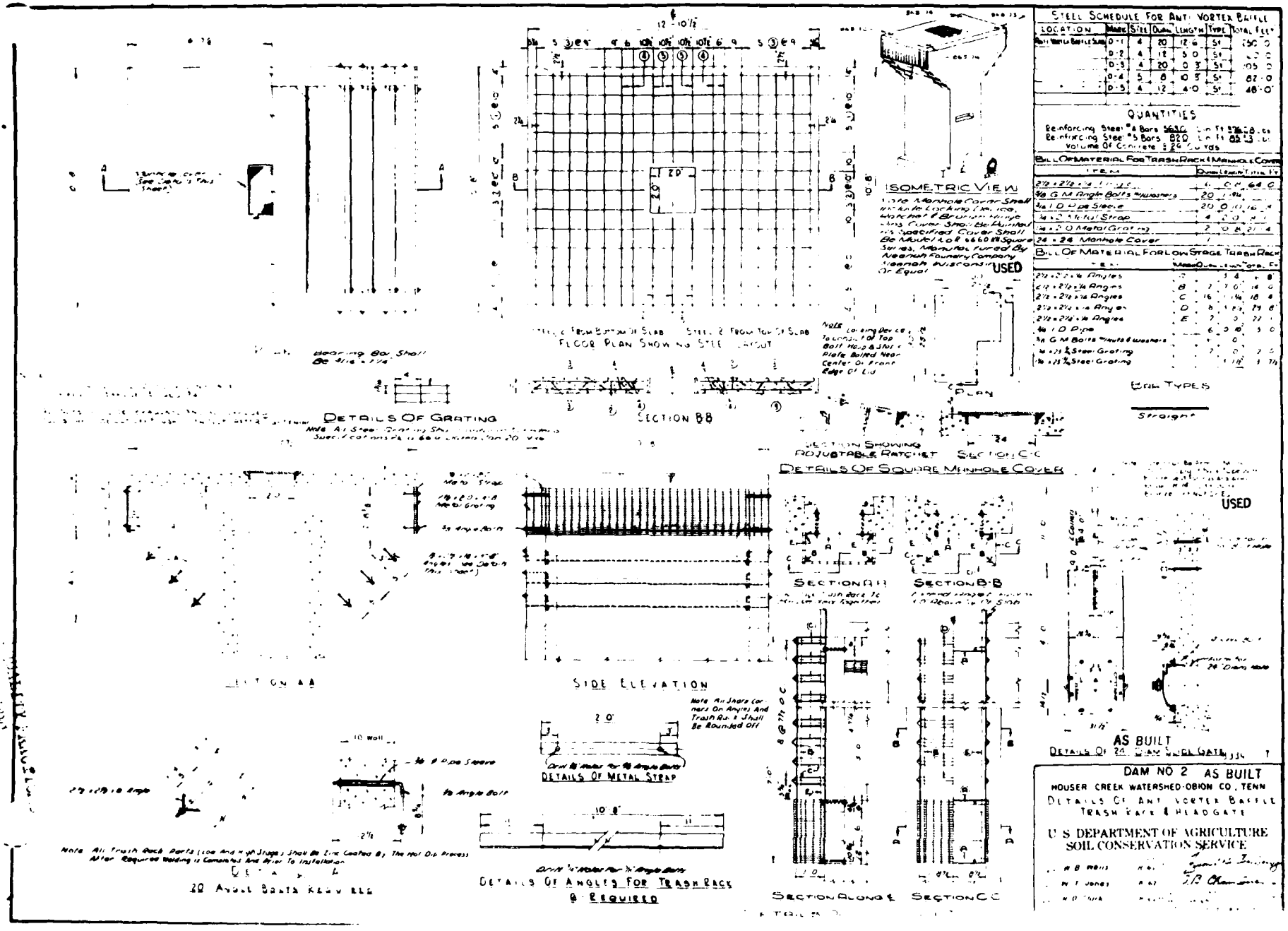
DETAILS OF 9'-0"x9'-0" REINFORCED CONCRETE RISER

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

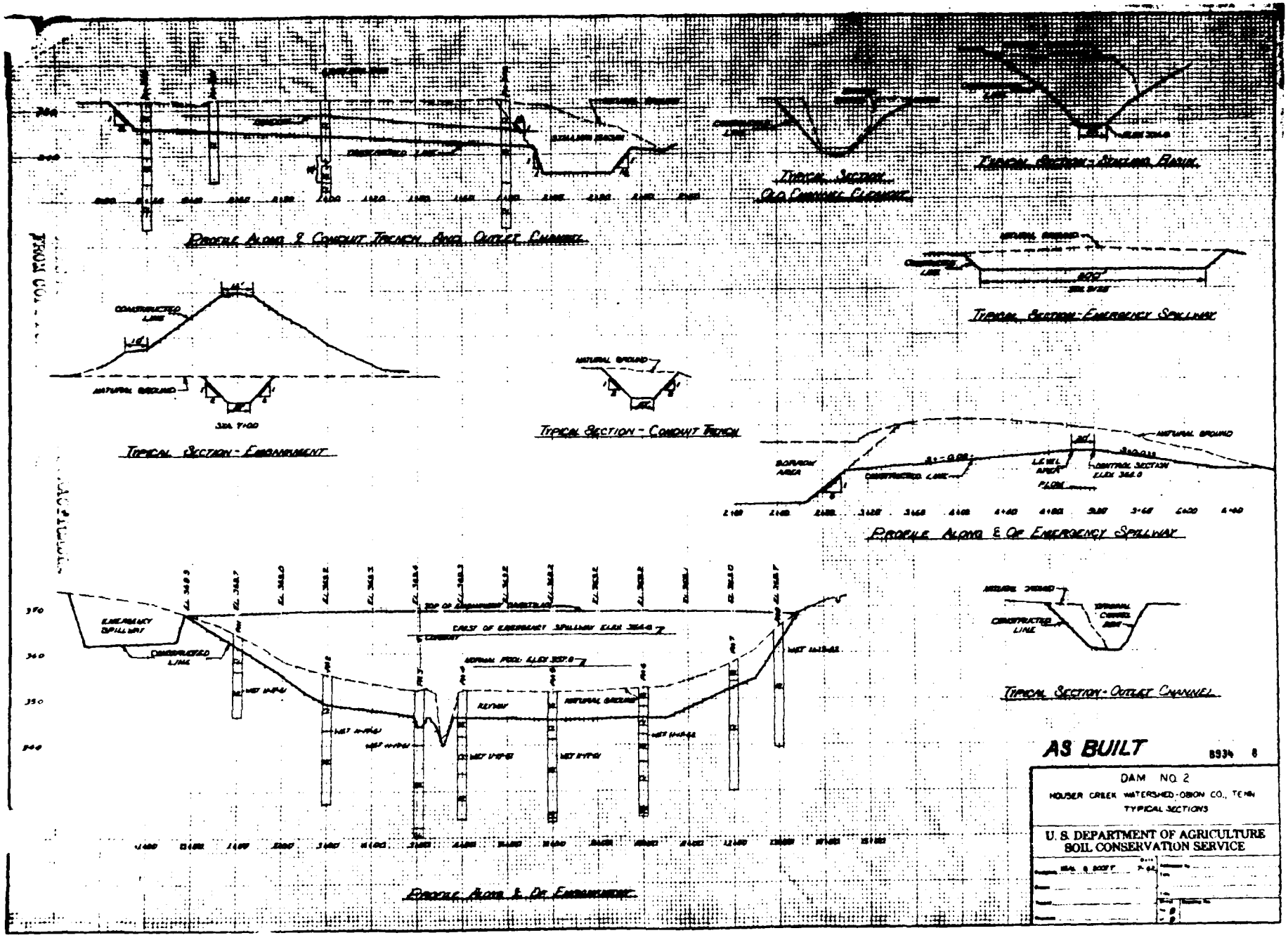
Designed	W. B. Wells	8-62
Drawn	R. T. Jones	8-62
Traced	N. P. Court	8-62

Approved: [signature]

2-E-57,078


DETAILS OF GRATING
FLOOR PLAN SHOWING STEEL LAYOUT
ISOMETRIC VIEW
USED
SECTION BB
PLAN
SECTION SHOWING ADJUSTABLE RATCHET
SECTION C-C
DETAILS OF SQUARE MANHOLE COVER
SECTION A-A
SECTION B-B
USED
SIDE ELEVATION
DETAILS OF METAL STRAP
DETAILS OF ANGLES FOR TRASH RACK
AS REQUIRED
SECTION ALONG ℄
SECTION C-C
AS BUILT
DETAILS OF 24' DAM SIDE GATE
STEEL SCHEDULE FOR ANTI VORTEX BAFFLE
QUANTITIES
BILL OF MATERIAL FOR TRASH RACK & MANHOLE COVER
BILL OF MATERIAL FOR LOW STAGE TRASH RACK
END TYPES
Straight
DAM NO 2 AS BUILT
MOUSER CREEK WATERSHED-OBION CO., TENN
DETAILS OF ANTI VORTEX BAFFLE TRASH RACK & HEADGATE
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

28


Profile Along ℄ Conduit Trench And Outlet Channel
Typical Section - Conduit Trench
Typical Section - Outlet Channel
Typical Section - Emergency Spillway
Profile Along ℄ Of Emergency Spillway
Typical Section - Embankment
Profile Along ℄ Of Embankment
AS BUILT
8934 8
DAM NO. 2
HOUSER CREEK WATERSHED - OBION CO., TENN.
TYPICAL SECTIONS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

APPENDIX I

HAZARD POTENTIAL

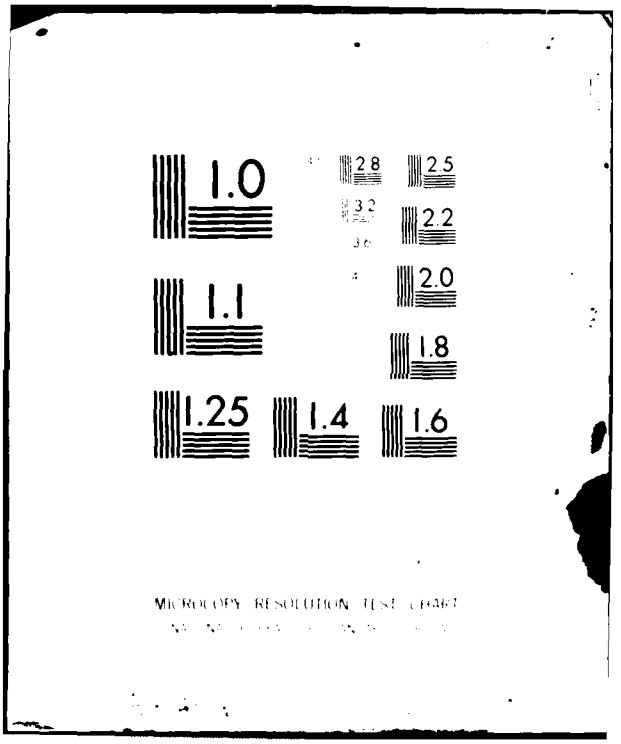
AND

CONDITION CLASSIFICATION DEFINITIONS

AD-A108 244 TENNESSEE STATE DEPT OF CONSERVATION NASHVILLE DIV O--ETC F/G 13/13
NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE, --ETC(U)
SEP 81 W E BUSH DACW62-81-C-0056

UNCLASSIFIED NL

2 OF 2


1.0
2.8
2.5
3.2
2.2
2.0
1.1
1.8
1.25
1.4
1.6
MICROCOPY RESOLUTION TEST CHART

DEPARTMENT OF THE ARMY

OFFICE OF THE CHIEF OF ENGINEERS

HAZARD POTENTIAL CLASSIFICATION*

Category	Loss of Life	Economic Loss
Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than few	Excessive (Extensive community, industry or agriculture)

*U.S. Army Corps of Engineers, Recommended Guidelines for Safety Inspection of Dams.

TENNESSEE DEPARTMENT OF CONSERVATION

DIVISION OF WATER RESOURCES

DAMAGE POTENTIAL CATEGORY*

Category	Description
1.	Dams located where failure would probably result in any of the following: loss of human life; excessive economic loss due to damage of downstream properties; excessive economic loss, public damage to roads or any public or private utilities.
2.	Dams located in predominantly rural or agricultural areas where failure may damage downstream private or public property but such damage would be relatively minor and within the general financial capabilities of the dam owner. Public hazard or inconvenience due to loss of roads or any public or private utilities would be minor and of short duration. Chances of loss of human life would be possible but remote.
3.	Dams located in rural or agricultural areas where failure may damage farm buildings or agricultural land but such damage would be more or less confined to the dam owner's property. No loss of human life would be expected.

* Tennessee Department of Conservation, Division of Water Resources, Rules and Regulations Applied to the Safe Dams Act of 1973. Chapter 0400-4-1.

DEFINITION OF CONDITION CLASSIFICATION

"Unsafe - Emergency" - A dam in a state of imminent failure. State and local authorities and downstream residents should be advised immediately, reservoir drained, or combination of the above (e.g., advanced piping, major slope instability, recent sudden collapse of a portion of the foundation, imminent overtopping, etc.).

"Unsafe - Nonemergency" - A dam with obviously serious deficiencies which clearly could develop, or are developing, into failure modes but do not yet pose the threat of imminent failure. State and local authorities should be advised promptly and remedial work should begin as soon as practical. Someone should be assigned to periodically check on the dam's condition until remedial work is begun. Drawing down the reservoir should be considered, e.g., flowing seepage from embankment which could lead to piping, evidence of solution channels or cavitation in the foundation, seriously inadequate spillway capacity as per ETL 1110-2-234, history of recurring slope instability, etc.).

"Significantly Deficient" - A dam with deficiencies which, if left unchecked, would likely become serious deficiencies and could ultimately result in failure. Advise State authorities and recommend remedial work be scheduled in time to prevent substantial further deterioration of the condition(s)--usually within six months to a year or sooner (e.g., heavy growth of sizeable trees on slopes, potentially serious erosion, spillway discharge channel too close to embankment, etc.).

"Deficient" - A dam with deficiencies which need attention but which would not likely effect the safety of the dam unless left unchecked for a long period of time. Advise State authorities and recommend remedial action at owner's convenience but before the problem can escalate into a significant deficiency (e.g., brush and/or few or very small trees on embankment, long term deterioration of masonry or metal outlet features, formation of deep ruts in embankment roadway, deterioration of riprap, etc.).

"Not Deficient" - Well constructed and maintained dam with no apparent deficiencies relative to its safety and structural integrity.